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ABSTRACT

This study was designed to develop a skill anaysis test battery which would aid in the prediction of achievement in two specific areas of training. A total of forty educable mentally retarded students in work study classes were selected for training. A three part rating scale specifically for this study was used as criterion meansure against the results of the battery of skill tests. The results yield nine skill test measures whose correlations with the criterion measures were statistically significant. The skill tests failed to produce significant correlations with the rating scale of general adjustment. The findings point to the need to separate these criteria of adjustment and achievement in selection of clients for training programs. (KJ/Author)

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Rehabilitation Series 2

SKILL ANALYSIS AS A TECHNIQUE FOR PREDICTING VOCATIONAL SUCCESS OF THE MENTALLY RETARDED

Project No. RD-2599-P

Gerald I. Manus, *Project Director*
Marika Kovacs
Norman Roberts
Barbara Levy

INA MEND INSTITUTE
at
HUMAN RESOURCES CENTER
ALBERTSON, NEW YORK 11507

1970

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SIGNIFICANT FINDINGS FOR REHABILITATION WORKERS

The retarded client must be fully evaluated to define his or her specific vocational aptitudes.

Multiple perceptual and motor tests must be utilized to define these specific abilities.

Specific tests which are useful for predicting success in one vocational activity may not be useful for predicting success in another kind of vocational activity.

Separation between global personal-social ratings of behavior and specific job related skills can improve our rehabilitation programs.

Use of highly specific tests related to job skills can increase our ability to select clients who will succeed in specific training programs.

A skill test battery such as developed in this project can prevent arbitrary exclusion of the mentally retarded client from training programs in which he can succeed.

The relative importance of personal-social factors and specific skill factors depends on the nature of the job as well as the level of skill required in the job. It has been suggested that the lower the skill level required in the job, the more important become the personal-social factors. In other words, if little or no skill is required for a job the only criterion for continued employability is the personal-social factor.

Increasing attention needs to be given to the specificity of skills required for employment. The more explicit are the specifications, the more useful they will be in selection of clients for training and the development of appropriate training programs to meet the retarded client needs. Further, this approach will permit maximum utilization of the manpower potential of the retarded individual who is permanently relegated to low level occupations based on the assumption that his intelligence quotient is a sufficient measure to predict lack of success in a wide variety of occupations.

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INA MEND INSTITUTE

AT

HUMAN RESOURCES CENTER

The INA MEND Institute was established in May of 1968 through an agreement between the Insurance Company of North America and Human Resources Center to bring the newest in rehabilitation research to the insurance industry and to all of mankind. The Institute with its Executive Director and President of Human Resources Center, Henry Viscardi, Jr. is located at Human Resources Center, Albertson, New York. The Center is composed of three components: Human Resources School which offers a fully accredited education to previously homebound youngsters from pre-school through high school; Human Resources Research and Training Institute which conducts research, training, and demonstration programs in solving the problems of the handicapped; and the internationally known non-profit demonstration training and work center, Abilities Inc. The INA MEND Institute conducts seminars and serves as a research laboratory for the established MEND rehabilitation program of the Insurance Company of North America. The MEND program offers, on a national basis, to recently injured people a medical, financial, and vocational rehabilitation program. To supplement this program the INA MEND Institute offers practical research in rehabilitation and safety. Also through the INA MEND Institute Research Library, recent publications are distributed to INA Nurses and other professionals in the field of rehabilitation.

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FOREWORD

The present report is the third in a series of Research and Demonstration Projects carried out at Human Resources Center and Abilities Inc. related to the training and employment of the mentally retarded. The initial study which was completed in 1967 established that the mentally retarded individual could be trained and employed in competitive jobs in industry and business.

The second phase of the work in this area was completed in 1968 when the initial stage of this present study developed a preliminary skill analysis battery. The battery came out of a job analysis of the Clerical/Banking and Industrial/Electronic training programs at Abilities Inc. The present study refined that battery and established its validity against the ratings of training supervisors in these two training areas. The results reinforce and clarify our understanding of the training potentiality of the educable mentally retarded client. Although the findings must be considered preliminary, they do suggest directions in the rehabilitation of the educable mentally retarded client that have been previously neglected or ignored: namely, training in skill areas for this group of handicapped clients.

The vistas of vocational rehabilitation can be further broadened by opening the doors of the skill training areas to the mentally retarded client who has previously been locked out by unsubstantiated assumptions regarding his inability to profit from a well conceived and carefully programmed training course.

Henry Viscardi, Jr.
President

HUMAN RESOURCES CENTER

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In developing the special skill tests, in completing the rating scales, and in assisting in the job analysis criteria on which the rating scales were based, the project staff is deeply indebted to Elery Bean, Walter Krauss, Ruth Kass, Virginia Kasten, Betty McDermott and Jean Mudge; special appreciation is owed to Alex Alazraki and the Abilities Employee Recreation Organization for assistance in the arrangements for the recreation activities for the trainees; to Jessie King for her persistent and productive efforts in recruiting the trainees for the program and helping to maintain liaison between the Division of Vocational Rehabilitation Counselors, the special school teacher and the project staff; to Drs. Leonard Blackman and William Younie, Gary Siperstein and Agnes Berger, who developed the general structure of the early phase of the project and who experienced the pain of the early stages of the project without the satisfaction of participating in its successful completion; to Richard Switzer for his cooperation in arranging space for the group counseling sessions and for his interest in the trainees; to Frank D. Gentile for his able coordination, review and friendly prodding that made the project staff move along at the pace necessary for completion of its goal; to Dr. J. Richard Block for his periodic reviews and final reading of the manuscript which provided valuable guidance in making the final report a more readable and intelligible document.

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Roosevelt High School
Westbury High School
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VOCATIONAL SKILL ANALYSIS OF THE EDUCABLE MENTALLY RETARDED CLIENT

Forty educable mentally retarded clients in work-study programs in the Long Island High Schools who had been referred by their local school and their Division of Vocational Rehabilitation Counselor were placed in the training programs at the Human Resources Center. Each student was exposed to a 12 week training program comprising six weeks of training in Clerical/Banking activities and six weeks training in Industrial/Electronic Assembly activities. A three-part rating scale specifically developed for this study was used as the criterion measure. The clients (students) were tested on a battery of skill tests specifically developed for this project or adapted from standard tests.

CHAPTER 1

INTRODUCTION

HISTORY, PURPOSE, AND RATIONALE OF THE STUDY

The Human Resources Center completed a five year study in February, 1967 (VRA Grant RD–1036) to identify and demonstrate those broad evaluation and training factors which would facilitate optimal employment opportunities for the retarded worker. As an outgrowth of that project further attention was focused on the need for specific identification of the "intellectual, physical, and psychomotor variables which should be predictive of successful performance." It was felt that this could best be accomplished by a dual attack on the problem of job analysis and the development of a predictive skills test battery related to this job analysis.

The two areas subsequently selected for analysis and training were the areas of Clerical/Banking and Industrial/Electronic Assembly. The former included such activities as posting, checking, packing and repacking of bank books, machine entries, money handling, and account tabulation. The Industrial/Electronic assembly area included a wide range of soldering tasks, wiring, and cable harness assembly.

The development of the skill analysis test battery consumed the greater portion of the first year of this project in an effort to obtain tests with sufficient discrimination and reliability to make them appropriate indices of the skills defined in the job analysis. The planning and early part of this study were carried out under the Project Director of RD–1036, Leonard S. Blackman. In the second year of this program, the test battery was completed and the population sample was selected, tested, and provided with training in the two areas indicated above. The criterion rating scales were also developed during this second year. Test-retest studies were completed to determine the reliability of the instruments previously developed.

In view of the small sample available to the project and in view of the limited score discrimination provided by the instruments, the method of analysis was modified. Instead of dividing the population into four subgroups, a straight-forward correlational study was undertaken to maximize the use of the data. Implications of these correlational studies can be found in the Discussion Section of this report.

This report then is a summary of an effort, albeit preliminary, to define job characteristics, to develop a battery of instruments, to assess skills related to these job characteristics, and to determine whether these analyses can improve ability to predict successful training of educable mentally retarded persons in higher skill areas.

BACKGROUND RESEARCH

INTRODUCTION

The report of the President's Panel on Mental Retardation in 1962 represented a significant phase of public concern with the retarded. It highlighted the increasing social concern about the extent and impact of mental subnormality in the United States. The number of mentally retarded individuals in this country is currently estimated at close to six million. In an attempt to delineate what the nation can do to deal with the problem of mental retardation, the panel made an extensive number of recommendations. Specifically cited were: a need for continued research and strengthened educational programs; co-ordination of the efforts of vocational rehabilitation; and special education for subsequent employment.

A rapidly growing body of mental retardation research literature over the past two decades is further testimony to the increased concern. The magnitude of the problem of mental retardation is partially reflected by the immense expenditure of federal, state, and local funds since 1962. It has become increasingly clear that a highly concentrated effort is required to enable more mentally retarded individuals to achieve an independent, productive place in society (Stevens & Heber, 1964).

The purpose of this chapter is to present research trends relative to the occupational adjustment and vocational future of the educable retarded adolescent and adult. However, current research trends in this sphere are rooted in and tied to other diverse areas of investigation in mental retardation. Consequently, the presentation will be divided into various headings.

THE EDUCABLE MENTALLY RETARDED: A DEFINITION

It has been estimated that approximately 85% of all retarded individuals fall into the educable retarded or mildly retarded category (Stevens & Heber, 1964). The following concise summary of the group characteristics of the educable retarded was offered by Heber (1963):

1. General intellectual functioning which is below the average range of the general population;

2. A predicted or demonstrated inability to cope with the regular school curriculum at the typical age;

3. Potential for achievement of a minimal but significant level of basic academic skills when provided with curriculum and teaching techniques appropriate to their level of intellectual development; and

4. A potential for achievement of those social and occupational skills essential to independent adult living.

METHODOLOGICAL PROBLEMS

Methodological inadequacies and inconsistencies, characteristic of many areas of research, are especially prevalent in investigations of educational and vocational procedures

with the retarded. Consequently, various findings often appear contradictory and generalizations, if any, must be made with extreme caution.

Quay (1963) classified problems in methodology into three areas: the criterion problem, i.e., identifying and measuring the criterion appropriately for the given population; the sampling problem, i.e., defining and selecting a representative population sample; the experimental problem, i.e., establishing and maintaining a controlled experiment. Thus, the following review of research must be examined with these methodological weaknesses and variations in mind.

GENERAL BACKGROUND: EDUCATIONAL AND REHABILITATION SETTINGS

Traditionally, the goal of becoming a "productive" member of society has been of great importance in the United States. Vocational training, which up to the turn of the century was carried out largely through the apprenticeship system, later became an increasingly significant part of the public education system. Younie (1967) noted that the beginning of school programs that incorporated work experience is usually traced to Cincinnati, Ohio, with its pioneering work-study program of 1908.

Since the mid-nineteenth century, which saw the establishment of the first treatment center for the mentally retarded child, professionals have been concerned with facilitating the achievement of occupational and social maturity for the retarded individual (Goldstein, 1964).

Although one suspects that the early treatment centers tended to be largely custodial, there was, nevertheless, an emphasis on work activity for the residents. Thus, early residential centers relied heavily on work as a beneficial means of occupying the time of the resident. Farming and other institutional work activities represented the major program in early residential institutions. In contrast, current services have a focus on development of individual potential, although still retaining the work emphasis in many residential programs. State operated institutions have been joined by the public schools and other public or private rehabilitation agencies to provide broader services for the mentally retarded child and adult. Expansion of rehabilitation service to the mentally retarded in the early and mid-fifties of this century, particularly after the Rehabilitation Act of 1954, established the efficacy of rehabilitation programs for this population. The special value of sheltered workshops as training centers for the mentally retarded was thus clearly established (Levine, 1969).

One effect of this success was the development of work-study programs jointly sponsored by public school districts and the state divisions of rehabilitation. Many of the programs were developed under research and demonstration grants by the Social and Rehabilitation Service (then known as the Office of Vocational Rehabilitation and later as the Vocational Rehabilitation Administration). As a means of evaluating their services, these agencies have been conducting extensive research.

Doll (1967) in tracing problems in the development of educational practices for the retarded, noted that early practices varied from the use of a developmental approach and sensory-motor stimulation to practical instruction and training aimed at social adjustment. In recent years the use of differential diagnosis, remedial instruction, and comprehensive community planning are most prevalent. In the constantly evolving process of developing

programs for the retarded client, new trends in the use of on-the-job training, utilization of mental age indices in placement and selection, and differential education aimed at serving the various levels of retardation can be noted (Doll, 1967).

Historically then, the mentally retarded were first served by public treatment centers, mostly of the residential type. Over the years, however, services designed to assist the retarded individual to achieve social and occupational adequacy were increasingly taken on by large state operated institutions, public school systems and, most recently, by public and private rehabilitation agencies supported by Federal Grants (Goldstein, 1964). Two settings for education and training are particularly relevant to this review:

1. Public school programs for the retarded.

Special classes for the educable retarded pupil have been in existence for more than a half a century in public education. Younie (1967) places the first attempts at incorporated vocational education into public school special class curricula about 1940 with the inception of "occupational education" programs.

Currently, there seems to be general agreement that the objectives of special education for the retarded should include occupational and personal-social competence and some basic level of academic achievement (Johnson, 1962; Kirk, 1962; Quay, 1963). Within the past 15 years considerable attention has been given to evaluating the effectiveness of special class programs with respect to some or all of the above criteria.

2. Sheltered workshop programs for the retarded.

Younie (1967), in his overview of the development of sheltered workshops, noted that only within the last decade have sheltered workshops begun to serve mentally retarded clients. Prior to this time the sheltered workshop primarily served the physically handicapped. Sheltered workshop programs now provide specific vocational training for an array of entry level unskilled or semi-skilled jobs. These programs are now beginning to play a more prominent role in institutions as well as in private rehabilitation agencies (Younie, 1967). DiMichael (1966) and Cohen & Rusalem (1964) have emphasized the importance of integrating sheltered workshop, special education programs, and other vocational rehabilitation services.

Sheltered workshops, in whatever setting they many be located, generally aim at providing a recognized program of rehabilitation through remunerative employment coupled with various other rehabilitating activities in a protected, non-profit environment (Cohen, 1966). In reviewing the development and recent growth of sheltered workshops, Cohen (1966) noted that for complete services, a workshop needed to provide essentially 1) evaluation, 2) training, 3) short-term interim employment, and 4) terminal employment, in some cases.

In line with the attitudes prevalent today, Cohen (1966) remarked that sheltered workshops, rather than emphasizing the training of specific skills, should focus on the development of general work habits and attitudes necessary for successful employment. The importance and need for community support and involvement in the development of adequate and successful workshop programs is also noted.

SOCIO-EDUCATIONAL COMPARATIVE STUDIES: THE SPECIAL CLASS

As noted above, current objectives of special education for the retarded pupil cover the spheres of occupational and personal competence as well as academic achievement (Johnson, 1962; Kirk, 1962; Quay, 1963).

The number of youngsters served by special classes has been rapidly increasing. In part, this gradual increase is felt to reflect the assumption that special class placement is more beneficial to the retarded pupil than regular class placement (Kirk, 1964; Stanton & Cassidy, 1964). It has only been relatively recently, however, that research efforts have been aimed at ascertaining the efficacy of special class training. Comparing academic and social competence of retarded special class students and retarded regular class students has been the most frequently applied method for evaluating the effectiveness of special class programs.

The relatively large number of special class efficacy studies have produced confusing and contradictory results. Cassidy and Stanton (1959), for example, found superior academic achievement for the educable retarded in the regular class, but better personal and social adjustment for pupils in the special class. Thurstone (1960) reported no differences in gain scores on I.Q. and achievement tests for pupils enrolled in either regular or special class programs, although the special class pupils were reported to be better adjusted. On the other hand, various investigators reported that the isolation of special class placement may result in no difference or in negative social and personal adjustment (Johnson & Ferrera, 1958; Moyer, 1966; Meyerowitz, 1962).

Johnson (1962) after reviewing the special class efficacy studies noted that "special education has been well sold and widely accepted as being superior to general education for mentally handicapped children. ...despite an 'almost universal agreement' that mentally retarded children enrolled in special classes achieve significantly less academically than comparable children who remain in the regular grades."

Other reviewers of special class efficacy studies, having also examined investigations of later dates, similarly concluded that the bulk of empirical evidence does not demonstrate clear-cut and consistent benefits of special class as opposed to regular class placement (Blackman & Heintz, 1966; Kirk, 1964; Kirk & Weiner, 1963; Quay, 1963).

FOLLOW-UP STUDIES

Broadly speaking, a rehabilitation program's ultimate criterion of success is the extent to which it can aid the retarded to achieve an adequate vocational and social adjustment. To ascertain the long-term effects of special educational and training efforts, follow-up studies have served as the most common evaluation devices. Originally employed as a means of checking on the status of previously institutionalized retarded individuals, the follow-up method was later used by special education programs of the public school system to determine how their graduates fared in the community and in the world of work (Goldstein, 1964). The studies fall into two broad categories, early and later follow-up studies:

1. Early follow-up studies. The majority of early follow-up studies were simple status surveys of former "inmates" or students. Major emphasis was put on the extent to which the subjects were self-supporting, law-abiding members of their extra-institutional community. It should be noted that subjects of early studies did not have the benefits of

specially designed programs to prepare them for subsequent vocational and social adjustment. Despite this fact, the studies indicated that the educable mentally retarded individual could be employed gainfully and could adjust successfully to community living.

The first historically significant study of previously institutionalized retarded persons was reported by Fernald (1919). The results which stimulated a long line of subsequent follow-up studies, reported on the subsequent community adjustment of discharged "inmates" of the Waverly State School in Massachusetts during the period 1890–1914 (Younie, 1967). Correspondence, interviews with parents, friends, and others who had relevant information about the former "inmates," provide the data on status following discharge. A substantial number of former residents had married and became self-supporting. The data for males were noted to be encouraging, with a relatively low incidence of antisocial behavior and high incidence of good community adjustment. The jobs held by males were mainly in the unskilled category.

In a somewhat later study with improved methodology, Foley (1929) reported on the status of "inmates" released and "paroled" from the Rome State School, Rome, New York. This investigation, covering a 20 year period reported relatively few instances of antisocial behavior; a great majority of the former residents were employed and self-supporting. In a similar investigation, Johnson (1946) reported positive findings of community adjustment among former "inmates" of the Laconia State School, Laconia, New Hampshire.

The early follow-up studies of retardates previously enrolled in special class programs pointed in a similar direction. Baller (1936), for example, investigated the adult vocational, personal, and social adjustment of former special class pupils in Lincoln, Nebraska. Twenty-four percent of the former pupils were reported to have made a completely acceptable adjustment. Thomas (1943) reported on the status of 142 persons who attended public school special classes in Massachusetts between 1923 and 1928. Most of the men and women were found to have been employed at one time or another. As in all other follow-ups, the jobs held by these former students were largely at the unskilled or semi-skilled level.

Numerous similar studies during this era presented similar conclusions: namely that the educable retarded could cope with the demands of society. This conclusion created a positive impact on public attitudes and called attention to the need for early comprehensive training and preparation of retarded individuals.

2. Later follow-up studies. It is only recently that gradual acceptance of the retarded individual's work potential has been accompanied by appropriate rehabilitation efforts. There has been increased emphasis on vocational-occupational education and training within the special class, and quite recently, within sheltered workshop settings. Consequently, follow-up studies of the 1950's and 1960's focused on job and occupational adjustment of the retarded. Peckham (1951) for instance, attempted to identify important factors related to the job adjustment of retarded workers. Post-hoc opinions of counselors showed acceptance by fellow workers to be the most important problem. This study specifically highlighted the relevance of extra-personal variables in the vocational adjustment of retardates. Porter & Milazzo (1958) reported, in a comparative follow-up study, on the post-school adjustment of the retarded pupils in special class versus non-special class. Their results were found favorable to the special class pupils in terms of frequency of employment and social conformity. In a recent study, Gorelick (1966) reported on an attempt to assess the Level of Vocational Realism of high school retardates, and its relationship to post-high school employment success. Two of the findings were: 1) The effectiveness of a Work-Experience Program in high school did not affect students' Level of Realism, and 2) The

Level of Vocational Realism, in general, was not related to post-school employment success. Jackson (1968) in a follow-up survey of the employment adjustment of educable retarded students in the Edinburgh special schools concluded that one-third of the sample was "non-adjusted." In a similar vein, McFall (1966) found need for more extensive vocational and guidance programs in order to prepare the retarded student for occupational and community adjustment.

STUDIES ON SELECTION PROCEDURES AND PREDICTION

Ensuring the efficacy of vocational training programs requires attention to a complex set of factors. Most important is the necessity to develop methods of selection which can distinguish potential clients who may benefit from the services. It has been suggested that a reliable selection procedure would maximize the efficiency of vocational training programs in terms of time, money, and human energy inputs (Human Resources Center, 1967).

Selection procedures for vocational training programs have been traditionally time consuming and ineffective. The ineffectiveness is partially related to the fact that very little is known about the factors which may be associated with success of mentally retarded persons in various training areas. Patterson (1964), however, suggested the probability that a wide variety of factors are related to their vocational success. He noted that personality, ability, and demographic variables must be considered in attempting to identify important concomitants of vocational success for this population.

It should be noted that most investigations concerned with this issue focused on the institutionalized populations, and on low level or broad job areas with a vague general criterion of vocational success. No predictive studies could be located that deal with the retarded individual's success in highly specific vocational training programs.

In attempting to develop a battery of tests for the prediction of a retarded person's vocational success, investigators have explored the use of a wide array of assessment measures. Elkin (1968) related various predictive indices (e.g., Wechsler Adult Intelligence Scale, O'Connor Finger Dexterity Test, Bennett Hand Tool Dexterity Test, Purdue Pegboard, to the performance of educable retarded adults in a) sheltered workshop, and b) non-institutionalized domestic employment settings. The findings lent support to the hypothesis that a "general ability" factor, encompassing intellectual and psychomotor skills was related to sheltered workshop performance. However, the lack of correlation between predictive measures and job performance outside of the workshop was attributed to inadequate criteria as well as biased employee selection practices.

Larson (1964) found that WAIS performance IQ was able to discriminate between the vocationally successful retarded person. Warren (1961) found work and personality rating scales to be of greatest value in identifying successful retarded individuals in the community. Bae (1968) working in an institutional setting, found that successful trainees could be identified with the use of vocational adjustment measures. The significance of interpersonal behavior in vocational adjustment was reported to be relative to the degree of human interaction in the particular job areas. Special emphasis was given to the concept of differential as opposed to global vocational efficiency.

Tobias (1960) investigated various instruments in the hope of finding refined predictors of the retarded individual's placement suitability in a sheltered workshop and success in eventual competitive employment. The evaluation test consisted of work samples selected

largely from low level, unskilled contract job areas available at the workshop. The insufficient number of subjects employed in a competitive setting did not permit validation of the predictive measures for competitive employment. Within the workshop setting, however, the evaluation test was found related to the average hourly earnings of the 49 clients.

Patterson (1964) reviewed the various methods used to evaluate the vocational potential of mentally retarded clients. Taking account of the wide array of standardized aptitude, intelligence, and achievement tests in use, Patterson (1964) noted the paucity of appropriate tests for assessment of personality, intellectual or cognitive abilities. Work sample tests, such as those reported by Tobias (1960) were considered useful and worthy of further study, as were general work evaluation methods. Continuous observational types of evaluation in a work setting were felt to hold promise. Finally, the continuous nature of the evaluation process was stressed with the caution that it should not be looked upon as an end in itself.

The inadequacies of existing methods of assessment were also emphasized by Mordock & Feldman (1969). They proposed a technique of measuring cognitive functioning and its relationship to the vocational potential of the retarded client. Elmer (1967) analyzed the differences between successful and unsuccessful trainees of a vocational training program. In a similar vein, Kolstoe (1961) tried to isolate characteristics which differentiate the employed from the non-employed retarded men.

RESEARCH AND DEMONSTRATION PROJECTS

One of the most significant developments in the training of retarded persons has been the establishment of federally subsidized research and demonstration projects initiated in 1954, by the 83rd Congress (Wright & Trotter, 1968). Research and demonstration projects in mental retardation have been concerned with methods of evaluation and prediction of the retarded person's work potential along with assessment of the comparative success of different training methods and facilities (Wright & Trotter, 1968).

Wright & Trotter (1968) present summaries of six recent R&D projects related to mental retardation: "A School-Work Program for Retarded Youth" in Milwaukee, reports on a work adjustment program for retarded adolescents in their last year of high school. The program, which included counseling, field trips, sub-contract work, and parent counseling, produced no appreciable improvement in job holding or job finding of the retarded students since a majority of the students were found to be unemployed (Wright & Trotter, 1968). A study by Pinkard at the MacDonald Training Center, which attempted to develop a predictive instrument regarding the vocational potential of retardates, achieved some limited discrimination between three groups of individuals, i.e., day-care, sheltered, and those employed in competitive settings (Wright & Trotter, 1968). The Edward R. Johnstone Training & Research Center study by Parnicky investigated predictive facts in institutional, training, and community vocational adjustment, with low to slight success in the latter, and moderate success in the former (Wright & Trotter, 1968). An investigation at the University of Washington by Taylor found that many of the components of the test battery were correlated with work adequacy measures obtained from rating scales. Few of the components in the battery correlated with personality variables.

Two other studies reported by Wright & Trotter (1968) are also relevant: The Connecticut follow-up study of 1960 by Kennedy found, among other things, that retarded persons showed potential for upward occupational mobility. An investigation at the University

of Nevada by Jeffs studied the effect of occupational information upon the selection of vocational goals by retarded and slow-learning adolescent males. Both on-the-job training and occupational information appeared to affect patterns of interests and vocational choice in this group.

A research and demonstration project at the Human Resources Center tried to determine whether mildly retarded adolescents could benefit from specific, skill-oriented, vocational training (Human Resources Center, 1967). Only a "selected minority" of subjects were reported to have benefited from higher skill training with greater success in the industrial than in the clerical training areas. As a result of this finding, a follow-up training program was developed to meet the specialized training needs of retarded students.

OCCUPATIONAL OUTLOOK AND VOCATIONAL INTEREST STUDIES

Goldstein (1964) completed an extensive review of investigations into the types of occupations held by mentally retarded persons. The most outstanding trends of his review were: 1) under usual circumstances, most retarded pupils graduating from special classes will have some sort of occupational placement; 2) compared with the general population, retarded persons tend to have a slightly higher incidence of unemployment; and 3) retarded individuals tend to occupy those jobs which are classified at the unskilled or semi-skilled levels. Fraenkel (1961) similarly noted that most rehabilitated retarded individuals tend to hold low level jobs.

Rapid changes in industry and commerce brought about, in part, by automation may necessitate more highly specialized training for mentally retarded individuals. The business community, however, is becoming increasingly aware of the potential for hiring mentally retarded persons (Sleith, 1966). Rosenberg (1967) recognized the population of mentally retarded as a new, largely unexplored, source of manpower. In discussing the basic concepts involved in the hiring of the mentally retarded, he took into account relevant variables such as responsibility, dependability, types of employee reactions, work skills, and records of turn-over. In his overview, he saw all the factors as favorable to the retarded and suggested that more employers adopt the practice of hiring from this population. Younie (1967) noted, in his review, that specific vocational training, aimed at developing vocational capacity which is in demand, is one method of ensuring vocational placement and success of the retarded. Specifically, he suggested vocational training programs in a machine shop, in glove-making, the needle trades, and plastic manufacture. He called attention to the effectiveness of programs where a strong job market exists for the skill being trained. In reviewing projections on the vocational future of the retarded, Younie (1967) concluded that although the retarded individual can be successfully placed in the world of work, training opportunities for higher level jobs are needed. He called for: 1) aid that will help the retarded to achieve social maturity, and 2) a system of education which is integrated with the world of work.

Neuhaus (1967) reporting on a three year project at the Human Resources Center, similarly noted that educable retarded applicants could be trained and gainfully employed at specific industrial and commercial job tasks.

HOW CAN THE RETARDED BE TRAINED?

It has been noted that in spite of a generally enlightened attitude among profes-

sionals, much stereotyped thinking still exists in regard to what the retarded person can or cannot do. The contention that special classes may be under-stimulating the educable retarded pupil was supported by Fine (1967) who reported special class teachers to be less demanding of the retarded child. Rouse (1965) noted that reduced teachers' expectations block effective school planning for the retarded. Reporting on a training program aimed at enhancing productive thinking, he concluded that educable retarded pupils could profit from specially designed, higher level training.

Stereotyped expectations of the educable retarded client's vocational potential is similarly reflected in practically all the vocationally-oriented programs. As was previously noted, studies of vocational aptitude or achievement have concentrated on unskilled or semi-skilled jobs. Fortunately, one can notice the beginning of a more open-minded attitude with regard to the vocational potential of the retarded person. Strickland's conclusion (1964) that there seems to be little limitation for job training possibilities of the retarded individual, is an indication of this trend. Results of the program at Human Resources Center (1967) are also positive in that a number of retarded trainees were found to have benefited from specific higher skill training. Such indications of new vocational horizons for the retarded person are not only hopeful, but necessary, in light of the rapid decrease of unskilled and semi-skilled jobs. For an optimistic occupational outlook for the retarded population, more specific, higher-level training programs must be instituted. In addition, the development of more refined and reliable predictive measures for selection and placement are needed.

CHAPTER 2

METHODOLOGY AND PROCEDURE

SETTING

The setting for this project was at the Human Resources Center in Albertson, Long Island, New York. The Center is composed of three coordinated units: Human Resources Research and Training Institute, Abilities Inc., and Human Resources School.

The primary facilities utilized by this project were those associated with the Human Resources Research and Training Institute. This unit has 42,000 square feet of classroom, library, recreational, research, and office space. The medical and behavioral research areas include laboratories equipped for reception and recording of physiological and psychological telemetric data and comprehensive diagnostic testing. These are supplemented by an X-ray room, a dental facility, a research opthalmological facility, and general medical examination and evaluation rooms. Additional areas are equipped for research in medical electronics and orthotics. These facilities are augmented by a specialized technical and reference research library which serves all programs. The recreation resources include a specially designed indoor pool and two modified automatic bowling alleys.

Abilities Inc. is a non-profit work center similar to competitive industry. The work done at Abilities is highly varied with 400 industrial and clerical jobs in simultaneous production. Approximately 450 handicapped and mentally retarded persons are employed at Abilities. In addition to the specified training areas, the production lines at Abilities were also used to train some trainees at advanced stages of the program.

Also attached to the Center is Human Resources School. This school is uniquely designed and equipped for physically disabled children formerly limited to homebound instruction.

Although the setting for this program is similar to the previous one, some additional improvements were made, such as the provision of separate space for trainees in this project, the addition of a Training Supervisor in the Industrial/Electronic Assembly area, and an additional Supervisor in the Clerical/Banking area. Additional classroom space was made available in the Center to permit group counseling and classroom demonstrations which were made an integral part of the training program. In addition, graduate students were employed to provide group counseling for all trainees and to assist in the administration, scoring, and data collection of the skill tests.

PROGRAM OUTLINE

The program for the project included the following elements:

1) Job analysis for the Clerical/Banking area and the Industrial/Electronic Assembly area;

2) Development of Skill Analysis Test Battery;

3) Administration of Skill Analysis Test Battery to trainees;

4) a. Six weeks training of half of the trainees in the Clerical/Banking area;

b. Six weeks training for the remaining trainees in the Industrial/Electronic Assembly area;

5) Rotation of the trainees after the first six weeks of training. Thus, after 12 weeks, each trainee had six weeks training in one area followed by six weeks in the second area;

6) Each trainee was included in a group counseling unit led by a graduate student with experience in group counseling;

7) Periodic conferences were scheduled with the special education teachers and the vocational counselors to meet with the staff of the project;

8) Open house for parents of the trainees was held shortly after the beginning of the training program as a means of gaining the parents understanding and cooperation;

9) Following completion of the training periods in each area, ratings by the supervisors were obtained on the three parts of the Rating Scale utilized as the criteria for this study;

10) Analysis of the relationship between the rating scale and the skill tests were completed.

SUBJECTS

Subjects in the study were educable, mentally retarded high school boys and girls, enrolled in a work study program at Human Resources Center, Albertson, New York. The youngsters were assigned to the program with the cooperation of DVR counselors from the Long Island offices and on selection as "suitable" by their special class instructors. They were all drawn from the following 12 Nassau County and Suffolk County School Districts: Baldwin, Farmingdale, H. Frank Carey, Hicksville, Island Trees, Levittown, Massapequa, Mineola, North Shore, Roosevelt, Westbury, and Wyandanch. All were in special classes for a period of three or more years before coming to Human Resources Center.

The students were divided into morning and afternoon work-study groups on the basis of school schedules. They were assigned to start in either the Clerical/Banking or Industrial/Electronic assembly area first, on the basis of maintaining a numerical balance in the classrooms, and on a first to register first to be assigned basis. All the youngsters received the same exposure to the work study program, i.e., six weeks in each of the above-noted two training areas. Illness and absence provided some variance in classroom instruction, work-skill practice, and counseling.

The 40 students in the attentuated sample comprised 17 males and 23 females. The mean age for the 40 trainees in this validation sample was 203 months ranging from a high of 220 months to a low of 190 months; the standard deviation was 7.7 months. On the WAIS, the mean verbal IQ was 77 with a standard deviation of 8.3 for a range from 101 to 59; the Wechsler Performance Scale yielded a mean IQ of 76 with a SD of 9.6 and a range from 100 to 55; the Wechsler full scale IQ analysis resulted in a mean IQ of 75, with a SD of 7.9 and a range from 92 to 57.

All of the clients in the study were tested with the WAIS within a two year period prior to entry into the program at Abilities. The central tendency of scores approximated the accepted range for educable retarded adolescents. Thirty-six of the trainees had IQ scores on the full scale of the Wechsler of 85 or less; 35 had IQ scores of 85 or less on the verbal scale and 33 had IQ scores of 85 or less on the performance scale. Those whose IQ scores were above 85 had been in special education classes for a number of years because their academic deficiencies continued to remain below the minimum requirement for even the slowest educational tracks in the regular classes.

Trainees were chosen on the basis of being free of emotional and physical problems severe enough to limit their function in the work study program. Although no specific data on socio-economic status was available to permit reliable measurement of this variable, a majority of the students appeared to come from working class, non-professional, lower educational families; about one half of the group belong to the social group that has been described as culturally, socially, or educationally disadvantaged.

DESCRIPTION OF SKILL TESTS

INTRODUCTORY REMARKS

The specific task of RD–2599 was to assess the predictive validity of a battery of instruments, assembled on the basis of data obtained from task and skill analysis. The job description and skill analysis attempted to isolate and define discrete ability components necessary for success in banking and soldering training. Subsequent to this, an attempt was made to develop an objective, skill-oriented prediction battery. This investigation led to the employment of two types of instruments: standardized, commercially available instruments, and specially developed tests to meet the needs of the project. For the commercially available tests, however, the regular norms provided in some of the manuals were not utilized because the aim of testing was to discriminate levels of ability within the experimental population and not to compare the trainees' performance with that of "normals."

It should be noted that the importance of certain personality and motivational factors, which may be desirable for effective performance, were recognized. However, under RD–2599, no predictive instruments in this sphere were either developed or utilized. The difficulties involved in isolating necessary or desirable "personality traits" and the well-known pitfalls of validating measures in this area, were basically responsible for the omission.

Test Battery:

1. The Smedley Hand Dynamometer (C. H. Stoelting Co., Chicaco, Ill.) was deemed appropriate for the assessment of ability components in the following areas:

Industrial/Electronic Assembly:

Ability to control soldering iron over a period of several hours of steady usage.

Clerical/Banking:

Ability to pick up and carry baskets weighing as much as 20 pounds.

The Smedley Hand Dynamometer yields an index of grip strength. The task requires the student to exert his maximal grip on the "stirrup" of the Dynamometer. The grip pres-

sure is registered by a pointer, calibrated in kilograms, which stops at the point of fist closure. The trainee is asked to exert his maximal grip on the Dynamometer, using his dominant hand, and then the non-dominant hand. Three trials are allowed for each hand, with brief pauses between trials to avoid excessive fatigue. The registered pressure is recorded for each trial. The final score used is the maximal strength exerted by the trainee, recorded separately for the preferred and non-preferred hand.

2. The Bennett Hand-Tool Dexterity Test (Psychological Corp., New York, N.Y.) was utilized to assess the ability components in the following areas:

Industrial/Electronic Assembly:

a) Ability to judge quickly the size of various nuts, bolts, washers, etc., that may be used in making a mechanical assembly prior to soldering.

b) Ability to make temporary mechanical connections prior to soldering which may involve squeezing, twisting or turning spring or screw clamps, shunt clamps, etc.

The Bennett Hand-Tool Dexterity Test provides an index of proficiency in handling tools. Presumably, the level of performance on this test is a function of previous familiarity and experience with tools, coupled with mechanical aptitude.

The Bennett Hand-Tool Dexterity Test consists of a wooden frame constructed with two uprights attached to a horizontal base. Both uprights have three rows with three holes in each row. Nine bolt, washer and nut units, of three sizes (large, medium, and small), are fastened through the holes of one of the uprights. The trainee is provided with three tools: a large adjustable wrench, a smaller fixed wrench, and a screwdriver. The task requires the trainee to transfer as quickly as possible, the nine bolt, washer and nut units, from one of the uprights to the other.

Again, it should be noted that some of the trainees had difficulty with this test, mostly in understanding, remembering, and following the detailed instructions. Even after instructions were repeated several times, various trainees still could not complete the task according to the standard directions, i.e., making sure that heads of the bolts were on the inside, putting the washers on, or making sure that the bolt units were relatively tight and secure after transfer. The score is the time units which elapse from the moment the trainee picks up the first wrench, to the moment when he completes the transfer of the bolt units in the prescribed manner indicated in the standardized directions.

3. The O'Connor Finger Dexterity and O'Connor Tweezer Dexterity Tests (C. H. Stoelting Co.) selected to measure the ability components in the following areas:

Industrial/Electronic Assembly:

a) Ability to place fine wires in specific locations.

b) Ability to make temporary mechanical connections for certain wires or components prior to soldering.

c) Ability to use stripping tools on bench or in very tight quarters without cutting wire, removing strands, damaging remaining insulation or otherwise violating soldering specifications.

d) Ability to pick up small parts and move them to work quickly.

Clerical/Banking:

a) Ability to handle single sheets of paper quickly and to handle small bank books without dropping them.

b) Ability to develop manual rhythm for placing bank books, punching in, and recording results quickly and accurately.

The O'Connor Finger Dexterity Test and the O'Connor Tweezer Dexterity Test were designed to assess aspects of motor coordination, finger, and manual dexterity. Both instruments consist of a plate in which there are 100 holes arranged in ten rows. Testing during the pilot phase of RD–2599 (Spring, 1968) revealed that both instruments yielded results with fairly good discriminatory powers. The time distributions on the O'Connor Tweezer Dexterity Test tended to involve somewhat larger time spans than did the O'Connor Finger Dexterity Test.

In the O'Connor Finger Dexterity Test, the trainee is required to insert small metal pins, in groups of three, in each of the holes, using his fingers only. Basically, this test requires the ability to manipulate small objects rapidly, as well as some integration of gross manual and fine finger dexterity, motor coordination, and some aspects of spatial discrimination. The instrument has been found useful in predicting success in work requiring various types of assembly. In the O'Connor Finger Dexterity Test, the trainee's task is to fill all the holes on the board as rapidly as he can. The score is the number of seconds required to complete the task according to the standardized instructions.

In the O'Connor Tweezer Dexterity Test, the trainee is required to insert small metal pins, one by one, into each of the 100 holes in the board, using a standard metal tweezer to pick up pins from the tray and to place them in the holes. In addition to the abilities required in the Finger Dexterity Test, this test demands greater eye-hand coordination. The publisher's manual for this test considers high performance to be indicative of manual aptitude for work involving precision and steadiness in the use of small hand tools. As in the Finger Dexterity Test, the trainee's task is to fill in the holes in the board as rapidly as possible. The score is the number of seconds required to complete the task.

4. The Mail Scale Test:

The Mail Scale Test was developed specifically for RD–2599 to assess ability components related to the following training areas: In the Industrial/Electronic Assembly area, it was thought to be useful in estimating a trainee's ability to hold soldering tools of various types, for varying lengths of time and specific pressures. In Clerical/Banking, it was thought indicative of a trainee's ability to (1) exert specific pressures on keys and levers in order to activate machines, and (2) to press down a stapler evenly, thereby insuring good staple contact.

This instrument was intended to serve as a test of the ability to estimate pressure. The equipment selected was a standard, small postal scale, calibrated to measure weights up to 16 ounces, by 1/2 ounce intervals. Although it was recognized that such a scale would provide relatively gross estimates, it was, nevertheless, felt to be appropriate for obtaining sufficient discrimination between trainee's abilities to apply different pressures according to direction.

The question of whether some trainees may have used visual-spatial estimation to assist them in applying "appropriate" pressure to the scale must remain open. Although markings on the scale were not visible to the subjects, visual-spatial estimation of the different positions of the scale at various pressures by some trainees must be considered as a possible confounding variable.

Essentially, the task required consistency in reproducing a given pressure on the Mail Scale using the index finger of either hand. The test consisted of six pressures to be reproduced without reference to scale markings. After a single demonstration trial, estimates of pressures of 2, 4, 6, 8, 10, and 12 ounces were presented in a standardized random order by the examiner. Scores were calculated by finding the total of the deviations from perfect estimates for each of the above six values. Since each of the values was presented twice, 12 behaviors were observed, yielding 12 deviation scores for each subject. Deviations were recorded in 1/2 ounce units regardless of whether they fell above or below a perfect estimate. A low score was considered indicative of higher ability in estimating the magnitude of pressure necessary to accomplish the tasks presented.

5. The Blind Slide Scale Tests:

The Blind Slide Scale, Tests I and II, were developed specifically for RD–2599 to assess ability components in the Industrial/Electronic Assembly area; i.e., the ability to respond with consistent accuracy to the concepts: "a slight distance"; "approximately 1/8th of an inch"; "in the exact center"; "to one side"; "one terminal thickness"; and other designations commonly used in instructional and productive activities in that training area.

Overall, the instruments required 12 judgmental tasks. Part I required a trainee to estimate the center of a 6 inch metal ruler. The ruler was held at the ends by the examiner at eye level, the unmarked side facing the subject. A metal paper clip was attached to the ruler 1/2 inch or less from the end, in a fashion that allowed for easy movement across its entire length. Trainees were allowed four trials in which to move the paper clip to the point along the ruler that represented their best estimation of the exact center. Before each trial, the paper clip was moved back to an end of the ruler.

In Part II, estimates of specified distances were required. A similar metal ruler was used, also equipped with a metal clip. As in Part I, the unmarked side faced the subject. However, in Part II, the exact center of the ruler (3 inches) was marked by a line carved into the metal. Trainees were asked to estimate the specific distances of 1/2 inch, 1/4 inch, 3/4 inch, and 1/8 inch from the marked center of the ruler. Utilizing a standard order of presentation, trainees were directed to estimate the above distances, both to the left and right of the center line. In this way, each subject was allowed two trials (estimates) for each of the four distances indicated above.

Following preliminary use (Spring, 1968) modifications were made in the administration of Blind Slide Scale, Part II, to determine whether all trainees were familiar with the concepts of fractions of an inch used in the test. Each trainee was given a standard 12 inch ruler, and asked to show the examiner what space would be represented by the 1/2 inch, 1/4 inch, 3/4 inch, and 1/8 inch values. Subjects were not informed of the correctness or incorrectness of their responses.

In both Blind Slide Scale Tests (I and II), scores represented deviations from a perfect estimate, measured in units of 1/16th of an inch. Separate scores were obtained for Part I and Part II.

6. The Steadiness Test:

The Steadiness Test was developed specifically for RD–2599 to assess ability components related to the following training areas: In the Industrial/Electronic Assembly area it was thought to be useful in estimating a trainee's ability to accurately place a pencil iron into a closely delimited area without disturbing other wires or components; and in assessing the ability to place an iron in flux or cleaning solutions without spillage or excessive application of fluids. In the Clerical/Banking area it was thought related to the ability to quickly and accurately place a bank book into a special slot as required in a bank posting operation.

The instrument, designed by the Lafayette Instrument Co. (Lafayette, Ind.), to measure the psychomotor skill of steadiness was used in this study to assess accuracy of movement relative to gross hand coordination. The instrument consisted of a metal panel, fixed at a 45° angle on a wood base. The panel, 3-1/2 x 5 inches, was perforated by nine round openings, arranged in two rows of four and five, respectively. The openings sequentially diminished in size, the largest being on the upper left hand corner of the panel, and the smallest, in the lower right hand corner. Diameters of the openings ranged from 1/2 to 1/16th of an inch. A stylus was provided.

The trainee's task was to insert the stylus into each opening to a depth of approximately 1/2 inch, starting with the largest one, and withdraw the instrument without touching the hole perimeter. Both the stylus and the metal panel were wired, so that any contact would light a small electric bulb (hidden from the subject). The nine-hole sequence was attempted twice by each trainee, first with the dominant hand, then with the non-dominant hand. Each trainee was allowed a maximum of two trials to place the stylus into each opening and withdraw it. A successful first trial obtained a score of 2. Success on the second trial obtained a score of 1. Failure on both trials yielded a score of 0. Two total scores were recorded; a dominant total score, obtained by adding the values earned for each of the nine holes when the dominant hand was used, and a like total score obtained for the non-dominant hand. Higher total scores were taken to be indicative of greater steadiness and accuracy of hand movement.

7. The Spiral Test of Motor Inhibition:

The Spiral Test of Motor Inhibition was developed specifically for RD–2599 to assess ability components related to the following training areas: In the Industrial/Electronic Assembly area the component was thought to be related to the need for care and planning in performing the assigned tasks. In Clerical/Banking it was considered to be related to a trainee's ability to control verbalizations and movements so as not to disturb other trainees.

The test consisted of two parts. Part I required a trainee to trace a spiral path with a pencil, at the individual's own preferred pace. The spiral was drawn on standard, 8-1/2 x 11 inch white, blank paper. It was approximately six inches in diameter. Part II required the tracing of an identical spiral path on a fresh specimen, under the direction to complete the task at the slowest possible pace.

Parts I and II were timed separately. The score was the time differential (in seconds) obtained by subtracting Part I time from Part II time. Lower differential scores were taken to be indicative of less control (greater impulsivity), while larger differences were thought to reflect a greater degree of control over motor impulsivity.

8. Wire Diameter Discrimination Test:

This test was developed specifically for RD–2599 to measure an ability component required in the Industrial/Electronic Assembly area. It was intended to measure discriminative ability between encased wires of different gauges or diameters. After the initial trial with a six-wire test series of 16, 18, 20, 22, 24, and 26 gauge wire proved to be inadequate in differentiating abilities, four additional wires were added to the series. The added wires were of 10, 12, 14, and 28 gauge. As in the original trial, one specimen of each of the gauges composed the test. The wires, which had a uniform length of 3-1/2 inches, were arranged before the trainee in a standardized order. In order to facilitate scoring, each wire casing was a different color. The trainee was then instructed to place the wires, which were arranged before him in parallel order, approximately 6 inches from the edge of the table, in the correct order from the thinnest to the thickest diameter. When the trainee indicated that he had completed the task, the order of color placement was recorded by the examiner. The trainee was not informed whether his placements were correct or incorrect. Since each wire from narrowest to widest was assigned a number from 1 through 10, the score for this test was the sum of the deviations from the correct order. To arrive at this score, each number in the trainee's sequence was subtracted from the preceding number; the sum of these remainders was used as the final raw score. A perfect raw score was thus equal to 9.

9. Clerical Test:

The Clerical Test was utilized to measure the ability components in the following areas:

Industrial/Electronic Assembly:

To read numbers from layout chart and match to small numbers on wire casing.

Clerical/Banking:

a) To be able to read small letters and numbers quickly and accurately.

b) To be able to scan books and deposit slips for specific items of information.

c) To be able to make rapid comparisons between deposit slips and pass books.

This test utilized Part 1, Number Comparison, of the Minnesota Clerical Test (Psychological Corp.) with the modification that it was administered without a time limit. The modification was made after initial testing indicated that the test was too difficult for a large majority of the trainees to complete within the time limit of standardized administration. The raw score was obtained by subtracting the number wrong from the number right; this difference then serves as the raw score. A perfect score on this test was 100.

10. Arithmetic Achievement Measurement:

This test was developed specifically for the project to assess ability components in the following areas:

Industrial/Electronic Assembly:

a) Ability to read numbers on wire casing.

b) Ability to count materials.

c) Ability to follow a sequence of numbers in a wiring harness arrangement.

Clerical/Banking:

a) Ability to add, subtract, and multiply to determine whether deposit slips are correct.

b) Count and tally change in coins and paper money.

c) Ability to utilize decimal point correctly in adding and subtracting.

This test involves basic arithmetic skills in counting, addition, and subtraction of whole and decimal numbers and multiplication of whole numbers. The test questions are arranged in order from least to most difficult. The points assigned to each question reflected the degree of difficulty. Thus, the first 5 questions which involve counting of dots were assigned 1 point each; the next 14 questions requiring simple addition and subtraction, were assigned 2 points each. The next 8 questions received 3 points each: 2 points for the correct answer and 1 point for correct placement of the decimal. The last 3 problems were assigned a total of 21 points: 2 points for each correct multiplication and 1 point for each correct addition. A perfect score on this measure was 78.

11. The Farnsworth Dichotomous Test:

The Farnsworth Dichotomous Test for color blindness (Psychological Corp.) was used to assess the components in the following areas:

Industrial/Electronic Assembly:

a) Ability to read color code from chart.

b) Ability to plan and match wires to specific terminals by color.

c) Ability to note very subtle color changes or reflective characteristics of molten solder which indicate its relative hardness.

d) Ability to note very subtle color changes on surface of metal or wire which would indicate presence of too much heat, prolonged iron contact, or often problems which would cause rejection of work.

All of the above ability components, explicitly and implicitly, call for various "abilities" such as "matching," "judgments," etc. which may be acquired through training relative to the specific task being performed. However, they all specify one underlying trait necessary for learning the task, that is, normal color vision.

The Farnsworth Dichotomous Test for Color Blindness, Panel D–15, was designed to distinguish, clearly and quickly, the functionally color blind from those with moderately color defective or normal color vision. The task requires the trainee to place 15 plastic color caps in order of changing hue, starting from a reference color cap. The test is scored as a unit; dichotomous analysis yields "Pass" or "Fail" as specified by the criteria in the manual. In case of a "Fail" score for any one person, the test is readministered in order to reconfirm the diagnosis of color blindness.

Since this instrument yields only two scores, it precludes the ranking of Ss on this trait. Consequently, results of this instrument are not included in the statistical analysis in the same manner as scores obtained from administration of the other instruments.

THE RATING SCALES: MEASURES OF PERSONAL AND SOCIAL ADJUSTMENT AND ACHIEVEMENT

HISTORICAL TRENDS

Early studies of adjustment and achievement with the mentally retarded person generally concentrated on minimal mental age or IQ level (Byrne, 1925; Channing, 1932). Later studies focused on perception, discrimination skills, and learning sets (Blackman, 1966). Patterson (1964), however, indicated that personality factors were necessary in assessing the vocational adjustment of the retarded person. Bae (1968) inferred that since training programs required close interaction between trainees and supervisors, interpersonal behavior may be more important in training program success than in actual job situations.

Adjective CheckLists for supervisors and for retarded trainees have been frequently applied. Instruments such as Bill's Index, the Vineland Social Maturity Scale, the Well's Concrete Direction Test, and a Vocational Capacity Scale have been used to assess training and post-training potentials of mentally retarded trainees (Wright & Trotter, 1968). The Warner, Meeker, Eels Index of Status Characteristics and the Syracuse Scale of Social Relations have also been applied with some frequency (Mayer, 1966). However, no single instrument has produced consistent reliability and validity in measurement of the educable mentally retarded person's personal-social adjustment or achievement. This appears to be a result of differences in operational definitions and variations in settings.

DEVELOPMENT OF THE PRESENT SCALES

In this study, personal-social adjustment of educable mentally retarded trainees was defined by their instructors' opinions of how the trainees met specific personal-social criteria within their work study area. Trainees were rated twice, once each at the end of training in two areas (Industrial/Electronic Assembly and Banking/Clerical).

The criterion for achievement was similarly defined as instructors' opinions of how each trainee demonstrated proficiency in performing specific assigned tasks in each of the two training areas. Achievement was also measured twice, once at the end of training in each of the two areas noted above.

The ratings used as measures of adjustment and achievement had their origin in VRA Project RD–1036 (1967) at Human Resources Center. These scales were taken from the Merit Rating Performance Series (Industrial Psychology, Inc., Chicago, Ill.) with the scoring system adapted from the Attitude Toward Disabled Persons Scale (Blackman, 1963). The present scales were derived from an assessment and revision of the scales used in this earlier study. The modifications included the complete separation of adjustment and achievement scales and elimination of apparently less valid items.

The current adjustment and achievement measures utilized a 6 point scale, ranging from "Always True" to "Never True." Numerical values assigned to the different points on the scale ranged from 6 points for "Always True" to 1 point for "Never True." Corrections

were made for 5 questions in which the direction of the response was reversed (Adjustment Scale, numbers: 3, 18, 23, 24, 29). The reversed items served as a check on response set. The 6 point scale was used instead of the more traditional odd-numbered scale, in order to reduce a previously noted tendency for supervisors to rate trainees with middle values. It should be noted that this revision would tend to make high inter-rater reliability less likely.

The achievement measures contained 30 Clerical/Banking and 24 Industrial/Electronic Assembly items. Whereas a separate achievement scale was used for each training area, the same adjustment measure was applied to both training areas. The adjustment measure contained 34 items.

RELIABILITY STUDIES

Test-retest reliability for the above measures was not established. In order to establish re-test reliability within an appropriate time period, it would have been necessary to have the instructors re-rate students from the initial six-week training period at the same time they were rating their second group of trainees. In view of the instructors' overburdened schedules, it was felt that the procedure might confound second phase ratings. Therefore, no effort was made to obtain intra-rater reliability ratings based on test-retest measures.

Inter-rater reliability of the criterion measures was established as follows:

Each trainee was rated separately by each of the instructors. To obtain a total quantitative rating, the numerical value assigned by the instructor on each question was summed and then divided by the number of questions to yield an average rating. Thus, for each trainee, there was an average rating on the adjustment scale and on the achievement scale. In the Clerical/Banking area each trainee received these two average ratings from each of the three instructors. In the Industrial/Electronic area each trainee received the two average ratings from each of the two instructors.

In the Industrial/Electronic Assembly area all the trainees' ratings from each of the two instructors were ranked; the correlation was then calculated using the Spearman Rank Correlation Coefficient (rho) with correction for ties. In the Clerical/Banking area all of the trainees' mean ratings from each of the three instructors were ranked; the Kendall Coefficient of Concordance (W) was used to obtain the correlation coefficient. For the adjustment scale the mean ratings of all five supervisors for all trainees were ranked. This was done regardless of whether the trainee was rated during the first or second session of the program by supervisors in a particular training area. Correlation was determined by use of the Kendall Coefficient of Concordance (W).

The reliability of the rating measures indicated substantial inter-rater agreement. On the Clerical/Banking achievement measure inter-rater reliability among the three raters was: W=+.89, significant beyond the .001 level. On the Industrial/Electronic Assembly achievement the inter-rater reliability between the two raters was: r=+.75, significant beyond the .001 level. On the measure of adjustment inter-rater agreement for all five raters yielded a W=+.59, significant beyond .001 level.

It would seem that, in spite of the individual differences among the raters and the variability of the trainees over time, the measurements of achievement and adjustment in this study consistently yielded substantial, overall agreement among and between judges.

INSTRUCTORS' TESTS

As part of the work study program in both the Clerical/Banking and Industrial/Electronic Assembly areas, the trainees were given a series of tests to determine their readiness to perform the specific tasks necessary to assure competency in each area.

Since these instruments were used primarily for the above noted purpose, and for estimating teaching needs, rather than for evaluation after training, it is difficult, if not impossible, to determine whether pupil standing on the tests influenced the instructor's final evaluation as measured by the criterion ratings.

A design for measuring the influence of these tests, independent of other factors, was not provided in the study. However, even if such a design had been provided, the large variation in the number of trainees who were administered each instrument, and the lack of standardized, unbiased, administration procedures, would have made validity of the data questionable. Clearly, an opportunity to obtain quantifiable data was sacrificed to pupil-teacher needs in the learning situation.

For example, in the Industrial/Electronic Assembly area many of the instruments were self-scored by the trainees. One test (Resistor Color Coding) was given three times in order to insure that each trainee was completely familiar with the standardized resistor markings. These techniques may be considered a rather gross form of programmed instruction, in that the students were able to see the mistakes for themselves, and were afforded an opportunity to repeat procedures on subsequent re-tests, until the material was learned.

Supervisors in both areas indicated that the heterogeneity of the sample made this procedure necessary. Some of the youngsters had prior experience and knowledge of the skills required for the training, and some did not. Also, there was a substantial variation among the trainees in the area of reading and arithmetic skills. The teacher tests, therefore, offered the only means by which the instructors could be continually informed of the progress of the pupil in the sequential phases of the training program.

In the Clerical/Banking area four teacher tests were administered. They covered the following phases of training:

1. Money handling
2. Filing
3. Adding machine (key adder)
4. Deposit checking

There were six such instruments used in the Industrial/Electronic Assembly training area:

1. Soldering glossary
2. Resistor Color Code A
3. Resistor Color Code B
4. Resistor Color Code C

5. Combination test of soldering procedures

6. Electrical assembly test

While samples of the individual instruments are available, a brief description of the tests and their derivation may add to an understanding of the rationale for their use.

TEACHER TESTS IN CLERICAL/BANKING

1. Money Handling: The money handling test measured a trainee's simple numerical ability and familiarity with currency. The test was developed during RD–1036 at Human Resources Center, where it was used as a retrospective criteria for measuring success of educable mentally retarded (EMR) teen-agers in the institution's Junior Banking operation. The trainees were asked to count the contents of a money box ($35 in assorted bills and coins), and to fill in a chart listing the various amounts of each denomination found in the box. Each trainee was then required to count small sums presented and to give change. The final portion of the test required trainees to take specific sums from the box as efficiently as possible, i.e., using the largest denominations. A perfect score of 53 reflected both efficiency and accuracy.

2. Filing: The alphabetical filing test measured the student's efficiency in basic filing practices. The test consisted of a list of 50 names (last name and initials) in a random order. A trainee was given a printed sheet picturing a bank of files, in which there were 60 consecutively numbered, simulated file drawers. Each drawer contained a range of alphabetically arranged letters. For example, drawer # 1 had the legend Aa–Alg, and drawer # 60 bore the letters Zow–Zyz. The trainees were instructed to place the names, which were on individual file cards, in that numbered file drawer which represented the correct alphabetical position for the name. The answers were then noted on an answer sheet provided. The scoring was as follows:

Each of the file cards was marked consecutively in a way that was undetectable to the trainee. A perfect score on this test was 0. Trainees were marked according to the number of spaces by which the card was displaced from the correct position or file drawer. While this test was also used previously as an instructional device at Human Resources Center in Junior Banking Training during RD–1036, the present form (described above), represents a number of departures from the original. Among the changes were the reduction of the number of cards from 52 to 50, the addition of the simulated file bank for visual reference, and the elimination of a numerical section.

3. Adding Machine (Key adder): Trainees were familiarized with the machine and its function; a chart provided a diagram of the machine keyboard and the proper fingering to be used. Trainees were given a set of exercises designed to teach the touch system on the keyboard. They were then assigned a Franklin National Bank deposit book taken from the Junior Banking Department at Human Resources Center and asked to add the figures in the balance (last) column and compare the total with the final total at the bottom of page. The score was the number of correct figures (including the total) copied in a 30 minute period. Training on the 10 key adder was included in previous training programs at Human Resources Center with different trainees. This particular test was drawn from the experience of the instructors and tailored to the needs of the students in training. The test measured the ability to perform simple arithmetic processes utilizing the necessary machine operations.

4. Deposit Checking: In the deposit checking test, the trainees were presented with a standard Franklin National Bank, Junior Banking deposit envelope containing a bank book, deposit slip, and the money to be credited to or withdrawn from the account, along with the prescribed forms and identifying data necessary to complete the task. The test required trainees to sort out the materials and to check the accuracy of the following items in the proper predetermined order: shortage, overage, incorrect notation, no notation, entering on an incorrect line, entering in an incorrect column, entering an incorrect sum/amount, incorrect account number, no deposit slip, name missing. Appropriate notation of any mistakes was required. The test was scored on the number of errors and the proper order of completion of the items. While the general goal of the training was competence at the commercial standard of two transactions per minute (without error) the test was not timed for the trainees. The instrument was essentially teacher-made and was based on a job analysis of the procedures used in the Junior Banking operation at Human Resources Center.

TEACHER TESTS IN INDUSTRIAL/ELECTRONIC ASSEMBLY:

1. Soldering Glossary: A vocabulary of 23 terms commonly used in soldering and electrical processes was derived from the experience of the instructors and from standard soldering texts. Prior to testing, the trainees were given the list of terms and told: "These are the words used in soldering. It is important that you know them. Keep reading this list until you know what all the words mean." In the test situation, trainees were asked to write the definitions of terms, i.e., circuit, stripping, tinning, etc., in a provided space. The test was scored on the basis of the number of correct answers. Definitions were revised prior to administration to allow for the reading levels of the EMR youngsters.

2. Resistor Color Code A: All resistors used in commercial and military specified electrical circuitry have standard color code markings consisting of four bands. The first three bands note the resistance in ohms, and the fourth band indicates the percent of tolerance of that particular resistor. Since these color codes are standard, and must be known to anyone attempting any form of electronic assembly, three tests were devoted solely to the teaching of the color code system. Test A presented the trainees with 20 different color combinations (4 colors each) representing differing amounts of ohms (resistor strength) and tolerances. The trainees were asked to write down on an adjacent line, the amount of ohms represented by the first three color bands, and the percentage of tolerance represented by the fourth band.

A chart with the key to the color coding was kept in view on the wall in the soldering instructional area as a reference point. The students were allowed to mark their own and other trainee's tests and were instructed to study those items that they found most difficult.

3. Resistor Color Code B: Test B presented the trainees with 20 different figures representing ohms of resistance and percentages of tolerance. In reverse of Test A, they were asked to translate the numbers and percentages into appropriate color code bands and write the answers down on a provided adjacent line. For example, question 3 presented the information 470 OHM–5%. The correct answer was: Yellow-Violet-Brown-Gold. As with Test A, the instructional chart was available as a reference point during the administration of the test and afterward during the self-marking period.

4. Resistor Color Code C: Test C was a repeat of Test B. The same format was used, with the exception that the numbers and percentages were changed to prevent depend-

ence on memory factors. As with the previous two tests, Color Code A and B, visual aids were available to the trainees and the instruments were self marked. All three tests were instructor made and administered. All were scored on the basis of the number of correct answers out of 20 questions.

5. Combination test of Soldering Procedures: and (6) Electronic Assembly test: Both of these tests, 5 and 6, represent a conglomorate of the knowledge deemed necessary for the trainees to successfully perform electronic assembly work according to military specifications in a competitive industrial setting. The individual tasks for which the knowledge was required were taken from a job analysis performed by Younie (1967) during project RD–1036 at Human Resources Center. Both tests, 5 and 6, were paper and pencil instruments conceived and administered by the instructors in the area. Each test contained 19 questions varying from completion items to fill-ins. The tests were scored on the basis of 19 correct answers equaling a perfect score. Test 5 repeated some of the material on Color Resistor Codes and asked trainees to identify common mistakes in soldering. Trainees were also asked to list the important points in caring for their instruments. The relative melting points of various metals were also compared. Test 6 once again reviewed the Resistor Color Codes and required the trainees to be able to identify the physical differences between resistors of different wattage. Soldering practices were re-emphasized and one section of the instrument dealt with the gauges and flexibilities of standard wires used in electronic assembly work.

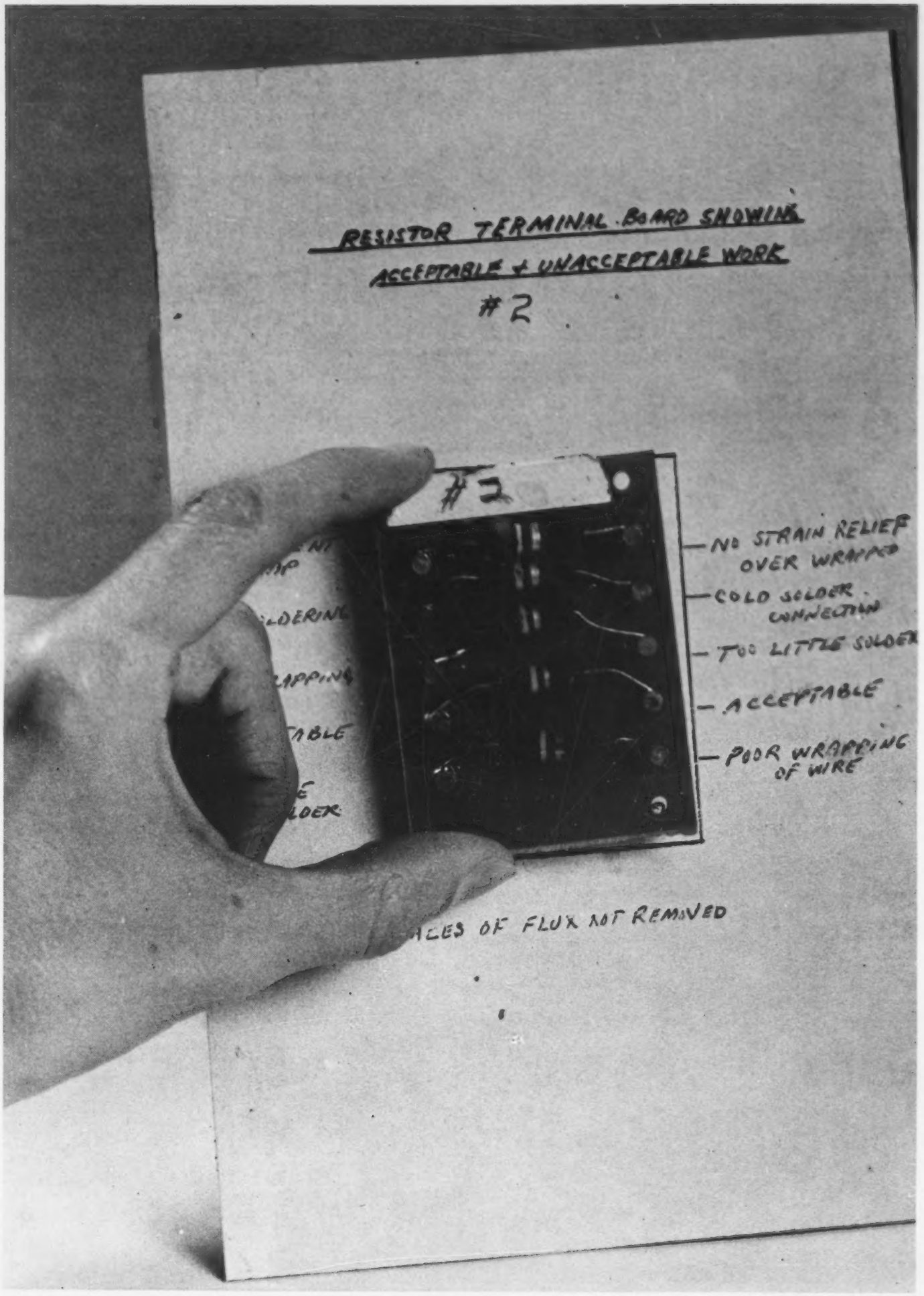
HOW TO READ RESISTOR COLOR CODES

A resistor stands in the way of the current in a circuit. The strength of the resistor is measured in "ohms" (Ω). A resistor has colored bands on it which tell you the value of the resistor. Each color band on the resistor stands for a number.

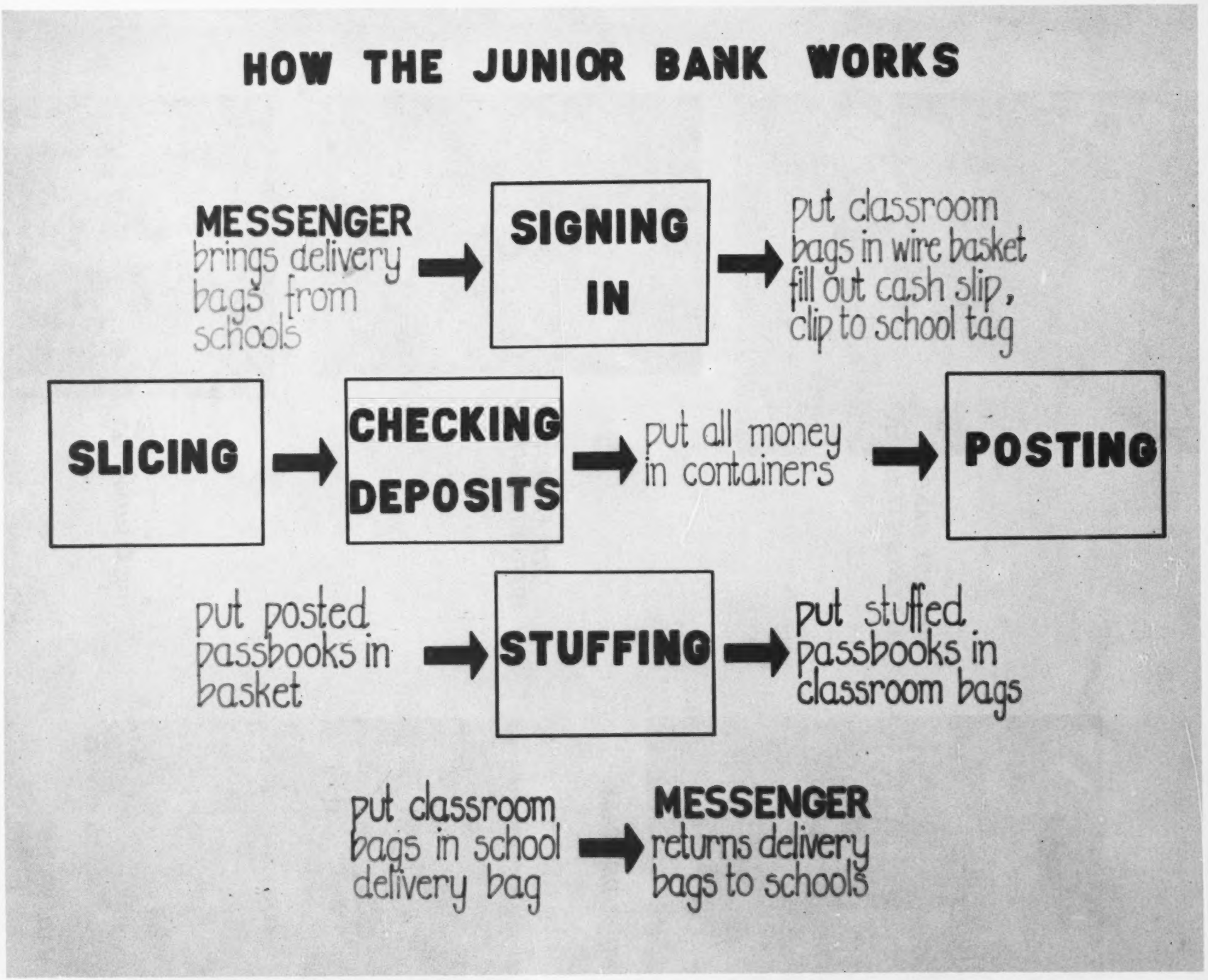
Fourth Band - Tolerance
Gold 5%
Silver 10%
No Band 20%

First Band		Second Band		Third Band	
BLACK	0	BLACK	0	BLACK	
BROWN	1	BROWN	1	BROWN	0
RED	2	RED	2	RED	00
ORANGE	3	ORANGE	3	ORANGE	000
YELLOW	4	YELLOW	4	YELLOW	0000
GREEN	5	GREEN	5	GREEN	00000
BLUE	6	BLUE	6	BLUE	000000
VIOLET	7	VIOLET	7	GOLD	Multiply by .1
GREY	8	GREY	8	SILVER	Multiply by .01
WHITE	9	WHITE	9	In the third band the letter 'k' can be used in place of three zeros.	

TEACHING AID: RESISTOR COLOR CODE CHART

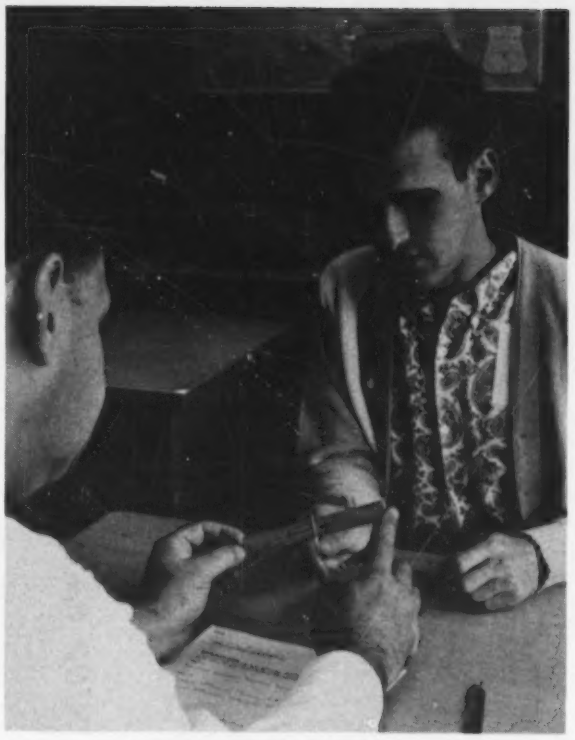


TEACHING AID: SAMPLE OF ACCEPTABLE AND UNACCEPTABLE SOLDERING


HOW THE JUNIOR BANK WORKS
MESSENGER
brings delivery bags from schools
SIGNING IN
put classroom bags in wire basket fill out cash slip, clip to school tag
SLICING
CHECKING DEPOSITS
put all money in containers
POSTING
put posted passbooks in basket
STUFFING
put stuffed passbooks in classroom bags
put classroom bags in school delivery bag
MESSENGER
returns delivery bags to schools

TEACHING AID: FLOW CHART OF JUNIOR BANKING PROCEDURE

ADMINISTRATION OF SKILL TEST BATTERY

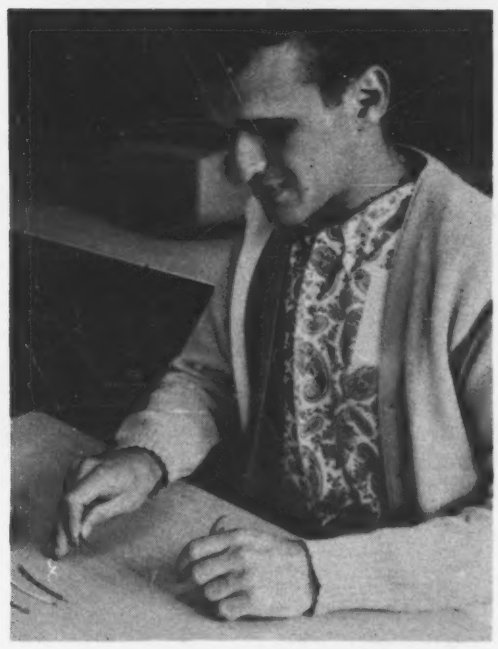


BLIND SLIDE SCALE

SMEDLEY HAND DYNAMOMETER

SPIRAL TEST OF MOTOR INHIBITION

MAIL SCALE



WIRE DISCRIMINATION TEST

TRAINING IN INDUSTRIAL/ELECTRONIC ASSEMBLY

TRIMMING OF WIRES ON JIG

TRAINING AREA FOR INDUSTRIAL/ELECTRONIC ASSEMBLY

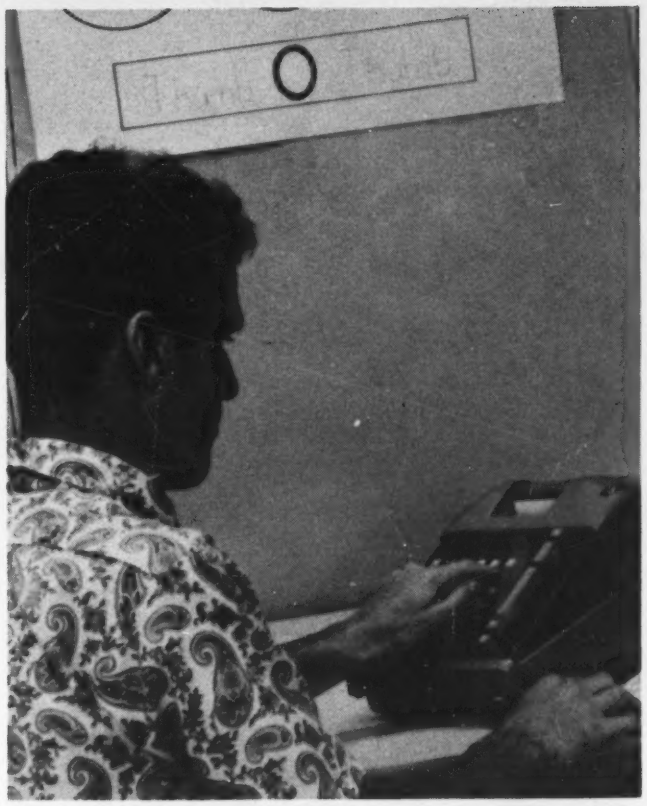
CHECKING TRAINEES' SOLDERING TECHNIQUE

COMPLETION OF WIRING FOR RADIO ASSEMBLY

WIRE HARNESS DIAGRAMS AID INSTRUCTION

TRAINING IN CLERICAL/BANKING AREA

TRAINEES PUNCH IN ON TIME CLOCK



ADDING MACHINE PRACTICE

PASS BOOK POSTING

REVIEW OF MONEY HANDLING SKILLS

CHAPTER 3

RESULTS

STATISTICAL TREATMENT OF SKILL TESTS

The battery of 13 skill tests were administered to returnees and newly recruited educable mentally retarded (EMR) trainees in September 1968, at the beginning of the program at Human Resources Center. These were: the Spiral Test of Motor Inhibition, the Smedley Hand Dynamometer Test, the Wire Diameter Discrimination Test, the O'Connor Finger Dexterity Test, the Bennett Hand Tool Dexterity Test, the Mail Scale Test, the O'Connor Tweezer Dexterity Test, the Minnesota Clerical Test (revised), the Farnsworth Dichotomous Test for Color Blindness, an Arithmetic Achievement Test, The Blind Slide Scale I, The Blind Slide Scale II, and the Steadiness Test.

A set of sampling statistics was later calculated for each of the above instruments, utilizing raw test scores. The original number of trainees in the total sample varied between 55 and 59 youngsters due to differences in valid test results in two cases and two prospective clients dropped out of the program leaving an N of 55.

After testing, 15 EMR adolescents who had participated in RD–1036 (1967) at Human Resources Center during the previous year were placed on employment status and thereby separated from the EMR youngsters (N=40) who were scheduled to start training in September 1968.

STATISTICAL TREATMENT

None of the derived sampling statistics yielded a normal distribution. Ordinarily, one would expect a larger sample to approximate a normal distribution; conversely, one would expect a smaller sample to reduce the probability of a normal distribution. However, since neither the original (N=55) nor the attenuated sample (N=40), yielded normal distributions, the decision was made to rank the raw data and utilize nonparametric statistics to ascertain correlation with the criterion measures, i.e., instructors ratings of trainee adjustment and achievement in the two training areas.

Because of low test-retest reliability, three of the instruments were eliminated from the final correlations. These were: The Blind Slide Scale I, the Steadiness Test, and the O'Connor Tweezer Dexterity Test. In addition, the Farnsworth Dichotomous Test for Color Blindness, which failed to demonstrate an ability to discriminate between the EMR subjects, was also eliminated from the correlational battery. The rank order of raw scores for each of the remaining tests were determined separately since there was no overall, uniform scoring method.

Measures of central tendency, range, and variability of the data obtained from the instruments comprising the skill test battery are indicated below in Table 1.

TABLE 1

DESCRIPTIVE STATISTICS

Test	N	Mean	Mdn.	S.D.
Blind Slide Scale II	57	72.0	47	61.3
Mail Scale	57	11.2	8	7.5
Bennett Hand Tool	57	876.8	825	376.2
Spiral Test of Motor Inhibition	58	101.6	38	144.6
Wire Diameter Discrimination	58	11.9	11.5	4.0
O'Connor Finger Dexterity	58	327.2	312.5	67.8
Smedley Hand Dynamometer (dominant)	58	32.8	31.5	11.8
Smedley Hand Dynamometer (non-dominant)	57	32.4	30	12.8
Clerical	58	91.0	94	9.0
Arithmetic	59	53.4	60	15.1
Wechsler Verbal I.Q.	40	77.3	78.5	8.3
Wechsler Performance I. Q.	40	76.2	76	9.6
Wechsler Full I. Q.	40	75.2	75.5	7.9

TEST-RETEST RELIABILITY OF THE SKILL BATTERY

In addition to the 40 EMR trainees who started the work study program in September 1968, there were 15 EMR returnees from the preceding year. This sample included 5 girls and 10 boys. When first tested in March, 1968, they had a mean age of 17 years, standard deviation 6.6 months. The mean WAIS Verbal IQ for these 15 returnees was 77.6, S.D. = 8.1. The mean WAIS Performance IQ was 79.6, S.D. = 9.1; and the mean WAIS Full Scale IQ was 77.1, S.D. = 5.4.

Since a similar battery of tests had been administered to the returning trainees both in March 1968 and September 1968, a test-retest reliability study was completed on sets of scores obtained from identical measures. These tests included the Blind Slide Scale, Parts I and II, Mail Scale, Steadiness Test, both preferred and non-preferred hand, O'Connor Finger and Tweezer Dexterity Tests, Spiral Test of Motor Inhibition and the Smedley Hand Dynamometer, preferred and non-preferred hand. The Arithmetic Achievement Measure, the Modified Clerical Test, the Bennett Hand Tool and the Wire Discrimination Test, which had been revised for the final criterion validity study, could not provide test-retest data.

The first administration (March 1968) was preceded by six months of training at Human Resources Center. Instruction during this period consisted of standard job training under the supervision of the training instructors. Following testing, the trainees were placed in either the industrial or clerical area for a preliminary two-week evaluation. Upon completion of the evaluation, the trainees were assigned to a specific training area on the basis of instructors' evaluations. Subsequent training was similar to that received during the previous six months with the exceptions that: 1) the students were in a classroom situation, with a low student-teacher ratio, and 2) counseling was initiated.

In the clerical area the trainees were exposed to the techniques and usage of office machinery, filing, and money handling. Their abilities to retain information and to function efficiently for long time periods (both thought to be prerequisites of success in a competitive setting), were observed. The goal of the above training was to equip the youngsters for employment in either key-punch or banking situations.

The industrial training focused on a number of tasks which demanded the acquisition of increasingly difficult electronic assembly skills. Specifically, these were: wire preparation; harness and cable operations, terminal board assembly; printed circuit board assembly; soldering and rework; tube socket assembly and wiring; and plug soldering. The goal of the industrial training was to prepare the students for electronic assembly jobs in a competitive industrial setting.

In addition to the above noted programs, the summer vacation also separated the first and second administrations of the test battery. Both factors, therefore, must be considered as intervening variables in this test-retest study.

The test-retest reliability study was undertaken in February 1969, after the ranking of all test scores had been completed. Inspections showed that the Blind Slide Scale, Tests I and II, and the Mail Scale each had an N of 14 on initial testing (March 1968), and that the O'Connor Tweezer Dexterity Test had an N of 11 on initial testing. N equaled 15 on the second testing for all of these instruments. Given this data, and the fact that highly skewed distributions were obtained for all the tests, it was decided to utilize non-parametric statistical analysis.

The results of the Spearman Rank Correlation Coefficient (rho), with correction for ties, for ten test-retest measures are shown in Table 2. Six of the ten measures proved significant beyond the .01 level, while the remaining four did not prove significant. The six tests which had a high, positive retest correlation were Part II of the Blind Slide Scale, the Mail Scale, the O'Connor Finger Dexterity Test, the Spiral Test of Motor Inhibition, and the Smedley Hand Dynamometer (both dominant and non-dominant hands). The four non-significant tests included Part I of the Blind Slide Scale, the Steadiness Test (both dominant and non-dominant hands), and the O'Connor Tweezer Dexterity Test. The large correlation coefficients which were obtained with six of the tests, imply that those instruments are relatively unaffected by intervening practice or training.

TABLE 2

TEST-RETEST CORRELATIONS* (with tie correction)

TEST	BS_1	BS_2	MS	S_d	S_o	FD	TD	STMI	SHD_d	SHD_o
BS_1	(14) -.37+									
BS_2		(14) .73+++								
MS			(14) .64+++							
S_d				(15) .14+						
S_o					(15) .31+					
FD						(15) .87+++				
TD							(11) .13+			
STMI								(15) .81+++		
SHD_d									(15) .81+++	
SHD_o										(15) .88+++

*Spearman rho with correction for tied ranks

\+ = NS
++ = <.05
+++ = <.01 level

RELIABILITY OF THE SCALES:

A. Interrater reliability

Although all interrater correlations exceeded the confidence level of .001, there were some differences in the magnitude of the intercorrelations. Since the number of raters differed for each scale of the rating instrument, of necessity, different statistical tests lacking in exact comparability were utilized. Therefore, the significance of the differences between Kendall W & Spearmen rho cannot be fully understood.

In the case of the General Rating Scale, the agreement among the five raters was represented by a correlation, using the Kendall Coefficient of Concordance (W), of .60 yielding a probability value $<.001$. Correction for tied ranks did not alter the W.

The two achievement scales (Clerical and Industrial) had three raters and two raters, respectively. The raters in the clerical area were not the same raters as those in the industrial area. For the clerical area, the Kendall W was utilized, yielding a correlation of .90. No change was produced by correcting for ties. In the Industrial/Electronic area, a Spearman correlation, corrected for ties, resulted in a correlation of .76. It should be noted that unlike the W correction for ties which increases the value of the correlation, the Spearman correction serves to reduce the correlation value; therefore, in both cases, we are reporting the minimal statistical agreement between the two raters. This would lead to a Type II error were it not for the fact that all measures are already beyond the .001 level of significance.

B. Check on Response Set

An analysis was made of the effect of reversing response direction with five questions (#3, 18, 23, 24, 29) in the general part of the rating scale. First, the response distribution for each of the five raters on the 29 questions of the general section of the rating scale were tabulated; separate tabulations were made for the five reversed questions. A chi square test was used to test the assumption that there was no difference in the nature of the distribution between the five reversed questions and the remainder of the scale. The probability values for all chi squares was $<.001$ level suggesting that the raters were taking cognizance of the reversal in the direction of the questions and were not answering these five questions with an established response set.

INTERCORRELATIONS BETWEEN THE SKILL TESTS

In the test-retest reliability section of this report, it was indicated that the Blind Slide Scale (Part II), the Mail Scale, the O'Connor Finger Dexterity Test, the Spiral Test of Motor Inhibition, and the Smedley Hand Dynamometer Test (both dominant and non-dominant hand), were at respectable levels of reliability to consider them as reliable measures; the latter four tests, however, came closest to the ideal in reliability ranging from .81 to .88 whereas the first two tests named seem more dubious in their reliability with correlations of .73 and .64, respectively. Nevertheless, all six coefficients, obtained by the Spearman Rank Correlation Technique with correction for ties, were significant beyond the .01 level of confidence.

No reliability data are available for the Arithmetic Measure, the Wire Discrimination Test, the Bennett Hand Tool Dexterity Test and the Clerical Test since these tests were re-

vised or introduced following the development of the earlier battery. They are reported here with the reservation that their value as reliable measures is yet to be determined. All test intercorrelations can be found in Table 3.

The intercorrelations of the skill tests fall into three groups, separated on the basis of the significance level of the intercorrelations. The three groups contained tests whose intercorrelations exceed the .001, .01 and .05 levels, respectively.

First, taking into consideration the tests exceeding the .001 level of confidence we note a relationship between the Wire Discrimination (WD) and the following tests: Blind Slide Scale, Part II (BSS_2), Mail Scale (MS), Wechsler Verbal (W_v), Wechsler Performance (W_p), and Wechsler Full Scale (W_f). Similarly, there is a highly significant relationship (.001) between the Arithmetic Measure (A) and the following tests: Wechsler Full Scale (W_f), Rating Scale for Clerical/Banking (RS_b). The Bennett Hand Tool Dexterity Test (BHT) showed highly significant statistical relationship with: both parts of the Smedley Hand Dynamometer Test (SHD_d and SHD_o) and the rating scale for Industrial/Electronic Assembly (RS_I); the Blind Slide Scale, Part II (BSS_2) correlated very significantly with the Mail Scale (MS) and the Wechsler Verbal (W_v); the Wechsler Performance (W_p) produced significant correlation with the Wechsler Full Scale (W_f) and the Rating Scale for Clerical/ Banking (RS_b); the Wechsler Full Scale correlated significantly with the rating scale for Clerical/Banking (RS_b).

In the group of tests which exceed the probability value of .01 but do not reach the probability value of .001, we find the following: WD is significantly related to A, BHT and RS_b; the Clerical Test is significantly related to W_v; the Arithmetic Test is similarly related to the W_v and W_p Scales; the BHT is significantly related to the BSS_2, MS, FDT and W_p;the BSS_2 correlates significantly with W_f and RS_I; the MS is significantly related to the FDT and the RS_I; the FDT is significantly related to the RS_I; the Spiral Test for Motor Inhibition (STMI)is significantly correlated with the W_f; the $SHD_{d\&o}$ is significantly correlated with the RS_I; the W_p is significantly related to the RS_I; the W_f is significantly related to the RS_I.

Low but potentially useful correlations significant beyond the .05 level but not reaching the .01 level were the following: WD, FDT, STMI, RS_I; CL (Clerical Test), A, FDT, W_f; BHT and W_f; BSS_2, $SHD_{d\&o}$, W_p; MS, W_f; BHT and W_p; STMI and W_p; W_v, W_f, RS_b.

INTERCORRELATIONS BETWEEN TESTS AND SCALES

	WD	CL	A	BHT	BSS_2	MS	FDT	STMI	SHD_d	SHD_o	W_v	W_p	W_f	RS_g	RS_b	RS_i
WD^N		+ .19	+++ .30	+++ .35	++++ .37	++++ .47	++ .24	++ .23	+ .08	+ .09	++++ .37	++++ .41	++++ .45	+ .03	+++ .30	++ .27
CL^N			++ .25	+ .06	+ .13	+ .13	++ .22	+ .17	+ -.11	+ -.15	+++ .34	+ .15	++ .25	+ .03	+ .20	+ .10
A^N				+ .13	+ .12	+ .12	+ .06	+ .13	+ -.08	+ -.09	+++ .29	+++ .34	++++ .36	+ .14	++++ .44	+ .18
BHT^N					+++ .30	+++ .35	+++ .35	+ .14	++++ .45	++++ .42	+ .08	+++ .34	++ .23	+ .05	+ .12	++++ .42
BSS_2*						++++ .47	+ .17	+ .13	++ .26	++ .25	++++ .36	++ .21	+++ .35	+ .12	+ .13	+++ .29
MS*							+++ .29	+ .08	+ .10	+ .11	+ .16	++ .21	++ .23	+ .06	+ .16	+++ .35
FDT								+ .04	+ .02	+ .03	+ .13	++ .27	+ .18	+ .01	+ .09	+++ .29
STMI									+ .08	+ .14	+ .21	++ .27	+++ .33	+ .00	+ .10	+ .15
SHD_d										++++ .78	+ .10	+ .21	+ .18	+ -.05	+ -.03	+++ .30
SHD_o											+ .02	+ .21	+ .14	+ -.11	+ -.02	+++ .29
W_v												++ .28	++ .28	+ -.01	++ .28	+ .13
W_p													++++ .42	+ .12	++++ .47	+++ .36
W_f														+ .10	++++ .44	+++ .30
RS_g															++++ .61	++++ .70
RS_b																**
RS_i																

LEGEND:

WD	= Wire Discrimination
CL	= Clerical Test
A	= Arithmetic Measure
BHT	= Bennett Hand Tool
BSS_2	= Blind Slide Scale (Part I and II)
MS	= Mail Scale
FDT	= O'Connor Finger Dexterity Test
STMI	= Spiral Test of Motor Inhibition
SHD_d	= Smedley Hand Dynamometer (dominant hand)
SHD_o	= Smedley Hand Dynamometer (non-dominant hand)
W_v	= Wechsler Verbal Scale
W_p	= Wechsler Performance Scale
W_f	= Wechsler Full Scale
RS_g	= General Rating Scale
RS_b	= Rating Scale for Clerical/Banking
RS_i	= Rating Scale for Industrial/Electronic Assembly

* = Lower inter-test reliability (.64 and .73)

** = No meaningful correlation possible since these two scales were rated by different sets of raters

N = No reliability data available

\+ = Not significant
++ = < .05 level
+++ = < .01 level
++++ = <.001 level

VENN ANALYSIS

Venn Analysis Diagrams illustrate the relationship between the tests of the Skill Analysis Battery. Intercorrelations of these measures exceeding the .001 level of significance are shown in Figure I; relationships exceeding the .01 level but failing to reach the .001 level are shown in Figure II; those intercorrelations exceeding the .05 level of confidence but falling below the .01 level of confidence are shown in Figure III.

The interrelationship between those tests which exceeded the .01 and .001 levels of significance are combined into Table 4. Reading horizontally one can determine the tests which correlate significantly with any given test in the final battery of tests (excluding those tests whose reliability proved unsatisfactory).

FIGURE I

VENN ANALYSIS OF INTERRELATIONSHIPS BETWEEN SKILL TESTS AND RATING SCALES ACHIEVING .001 LEVEL OF SIGNIFICANCE

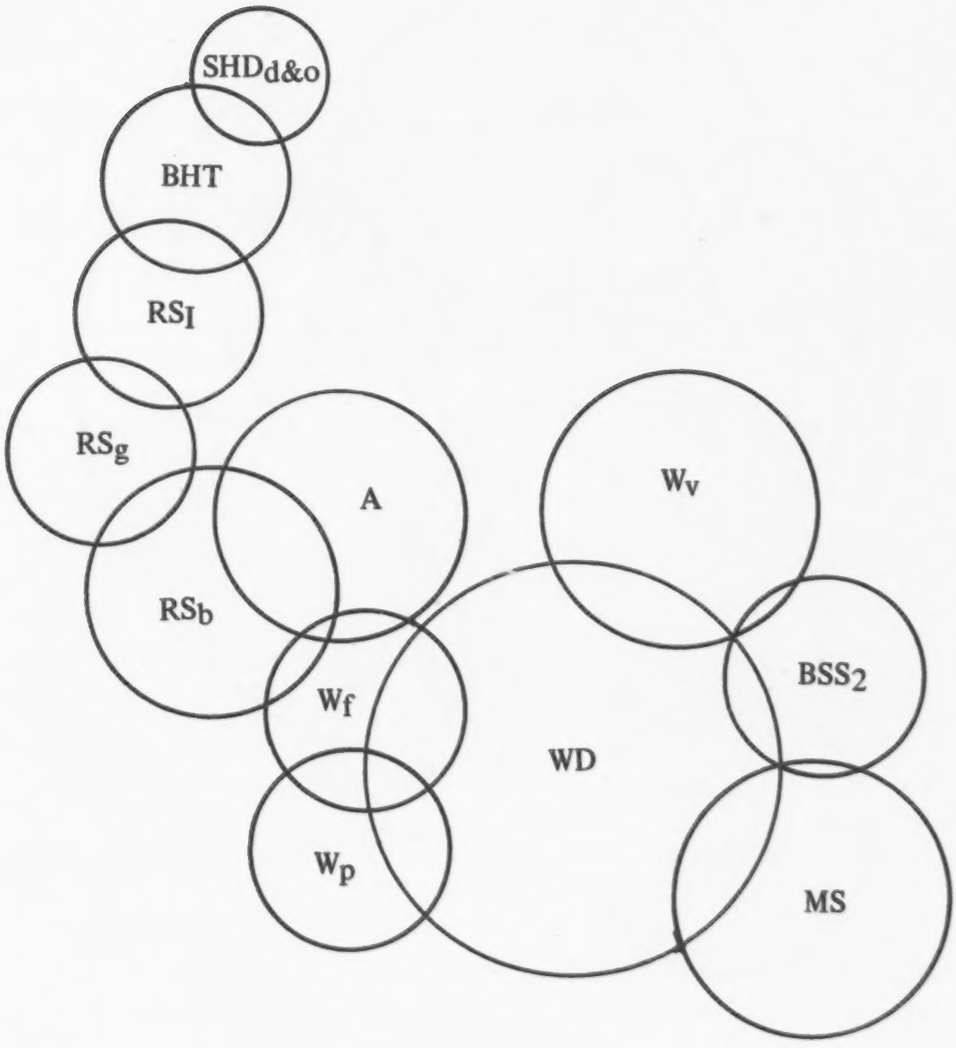


FIGURE II

VENN ANALYSIS OF INTERRELATIONSHIPS BETWEEN SKILL TESTS AND RATING SCALES ACHIEVING .01 LEVEL OF SIGNIFICANCE

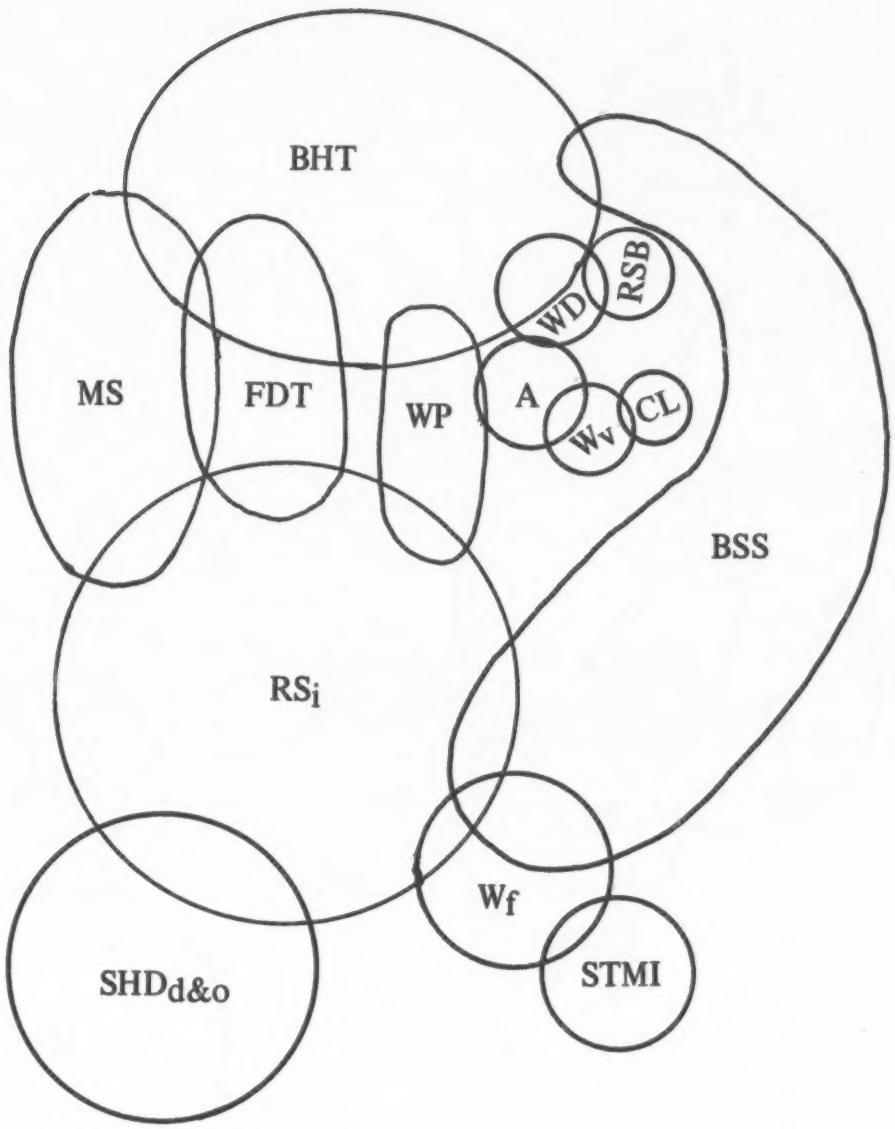


FIGURE III

VENN ANALYSIS OF INTERRELATIONSHIPS BETWEEN SKILL TESTS AND RATING SCALES ACHIEVING .05 LEVEL OF SIGNIFICANCE

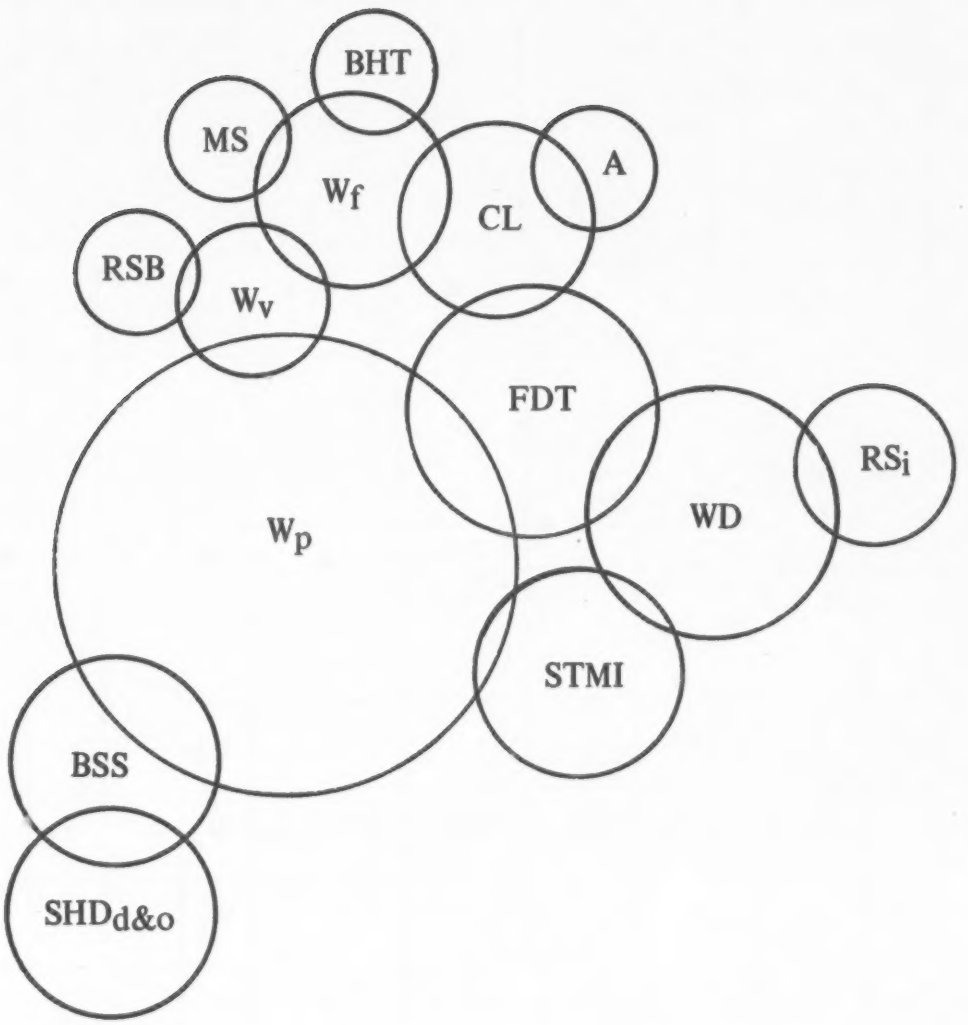


TABLE 4

INTERRELATIONSHIPS BETWEEN SKILL TESTS AND RATING SCALES ACHIEVING .001 AND .01 LEVELS OF SIGNIFICANCE

Skill Tests	Related Tests and Scales													
WD	–	–	A	BHT	BSS	MS	–	–	W_p	W_v	W_f	–	RSB	–
CL	–	–	–	–	–	–	–	–	–	W_v	–	–	–	–
A	–	–	–	–	–	–	–	–	W_p	W_v	W_f	–	RSB	–
BHT	–	–	–	–	BSS	MS	FDT	$SHD_{d\&o}$	W_p	–	–	RSI	–	–
BSS	WD	–	–	BHT	–	MS	–	–	–	W_v	W_f	RSI	–	–
MS	WD	–	–	BHT	BSS	–	FDT	–	–	–	–	RSI	–	–
FDT	–	–	–	BHT	–	MS	–	–	–	–	–	RSI	–	–
$SHD_{d\&o}$	–	–	–	BHT	–	–	–	–	–	–	–	RSI	–	–
WP	WD	–	A	BHT	–	–	–	–	–	–	W_f	RSI	RSB	–
W_r	WD	CL	A	–	BSS	–	–	–	–	–	–	–	–	–
W_f	WD	–	A	–	BSS	–	–	–	W_p	–	–	RSI	RSB	STMI
RSI	–	–	–	BHT	BSS	MS	FDT	$SHD_{d\&o}$	W_p	–	W_f	–	–	–
RSB	WD	–	A	–	–	–	–	–	W_p	–	W_f	–	–	–
STMI	–	–	–	–	–	–	–	–	–	–	W_f	–	–	–

INTERCORRELATIONS BETWEEN SKILL TESTS AND CRITERIA

Each of the three parts of the scale developed and utilized in this study will be considered as separate scales. As has been indicated earlier, the first scale which we have labeled the "General Scale" is a measure of overall work adjustment focusing primarily on behavioral observations of a general personal-social nature. The two other scales of the instrument, namely, the rating scale for banking and clerical activity and the rating scale for Industrial-Electronic Assembly activity are essentially measures of observed achievement in the respective areas.

First, reviewing the relationships between the General Rating Scale and the Skill Analysis Tests, we find that none of the correlations is significant; all intercorrelations fail to reach the .05 level of conventionally accepted significance.

However, in the intercorrelations of the Skill Tests and the Rating Scale for Clerical/Banking, five of the Skill Tests including the three parts of the Wechsler Adult Intelligence Scale reached or exceeded the .05 level of significance. The highest intercorrelation (.47) was obtained between the Wechsler Performance Scale and the Rating Scale for the Clerical/Banking area which is significant beyond .001 level of confidence; next in order of significance was the Wechsler Full Scale and the Arithmetic Measure developed for this study, both of which produced correlations of .44, also significant beyond the .001 confidence level. The Wire Discrimination Test yielded a correlation of .30, significant beyond the .01 level, while the Wechsler Verbal Scale produced a correlation of .28 with the rating scale which was significant beyond the .05 level of confidence.

The intercorrelation between the rating scale for the Industrial/Electronic Assembly area and the basic Skills Tests yielded a larger number of significant correlations. In all, there were nine significant correlations including two of the scales of the Wechsler Adult Intelligence Scale. In order of significance, these correlations were: Bennett Hand Tool .41, significant <.001 level; Wechsler Performance Scale .36, significant <.01 level; Smedley Hand Dynamometer (dominant hand) and the Wechsler Full Scale both .30, significant <.01 level; Smedley Hand Dynamometer (non-dominant hand), the O'Connor Finger Dexterity Test and the Blind Slide Scale (Part II), all significant <.01 level with intercorrelations of .29. The Wire Discrimination Test produced a correlation of .27 which is significant <.05 level. The following tables (5A and 5B) summarize the significant correlations for each of the achievement rating scales:

TABLE 5A

STATISTICALLY SIGNIFICANT TESTS: BANKING/CLERICAL

Test	Correlation	Confidence Level
Wire Discrimination	.30	exceeds .01
Arithmetic	.44	exceeds .001
Wechsler Verbal Scale	.28	exceeds .05
Wechsler Performance Scale	.47	exceeds .001
Wechsler Full Scale	.44	exceeds .001

TABLE 5B

STATISTICALLY SIGNIFICANT TESTS: INDUSTRIAL/ELECTRONIC ASSEMBLY

Test	Correlation	Confidence Level
Wire Discrimination	.27	exceeds .05
Bennett Hand Tool	.42	exceeds .001
Blind Slide Scale (II)	.29	exceeds .01
Mail Scale	.35	exceeds .001
Finger Dexterity Test	.29	exceeds .01
Smedley Hand Dynamometer (dominant-hand)	.30	exceeds .01
Smedley Hand Dynamometer (non-dominant hand)	.29	exceeds .01
Wechsler Performance Scale	.36	exceeds .01
Wechsler Full Scale	.30	exceeds .01

Specifically, noteworthy, is that two of the tests of the basic skills battery, namely, the Spiral Test of Motor Inhibition and the Clerical Test adapted from the Minnesota Clerical Test, failed to produce significant correlations with any of the rating scales.

Non-significant correlations with the General Rating Scale were obtained for the Blind Slide Scale (Part II), the Mail Scale, the Smedley Hand Dynamometer Test (both parts), the Bennett Hand Tool, the Wire Discrimination, the Arithmetic Measure, and all scales of the Wechsler Adult Intelligence Test.

For the Clerical/Banking Rating Scale, statistically non-significant correlations were obtained for the Blind Slide Scale (Part II), the Mail Scale, the O'Connor Finger Dexterity Test, the Smedley Hand Dynamometer Test (both parts) and the Bennett Hand Tool.

The Wechsler Verbal and the Arithmetic Measure yielded non-significant correlations with the Rating Scale for Industrial/Electronic Assembly.

A full summary of these correlations will be found in Table 6.

TABLE 6

CORRELATIONS BETWEEN SKILLS TESTS AND RATING SCALES (BS_B; RS_B; RS_I)

	RS_G	RS_B	RS_I
BSS_2	+ -.1169	+ .1292	+++ .2882
MS	+ .0591	+ .1569	+++ .3453
FDT	+ -.0115	+ .0951	+++ .2941
STMI	+ .0000	+ .0992	+ .1520
SHD_d	+ -.0506	+ -.0338	+++ .3002
SHD_o	+ -.1119	+ -.0204	+++ .2921
W_v	+ -.0104	++ .2808	+ .1279
W_p	+ .1205	++++ .4735	+++ .3565
W_f	+ .1003	++++ .4354	+++ .2983
BHT	+ .0472	+ .1189	++++ .4148
WD	.0255	.3039	.2668
CL	.0324	.1972	.1012
AR	.1385	.4378	.1799

KEY:

+	Not Significant
++	<.05 level
+++	<.01 level
++++	<.001 level

THE COUNSELING PROGRAM

As was indicated earlier, a counseling program was added to the project in light of experience in RD–1036 which suggested that the EMR trainees could benefit from an on-site counseling resource for discussion of their day-to-day problems. The group counseling which was provided was not intended to replace the long-term counseling provided by the DVR counselor of the trainees. This latter counseling relationship continued para passu in the areas of long-term vocational goals, job placement, and future training as required. Furthermore, the relationship between the special education teachers, the DVR counselors and the Human Resources Center project staff was facilitated by periodic meetings toward the goal of sharing information about the trainees. The results of these conferences were to further the training and educational development of the trainees and plan for their future programs following the completion of the 12-week training program.

Although the results of the counseling could not be quantified, the review that follows is intended to clarify the purpose, indicate qualitative findings of the counseling program, and suggest further guides in the use of the counseling process as an adjunct to the training programs with EMR clients.

A review of the published studies on psychotherapy and counseling with mentally retarded youngsters reveals a paucity of data (Stacey & De Martino, 1957; Thorne, 1960; Kessler, 1966). Sarason & Gladwin (1958) attribute the condition of the research to a scarcity of trained personnel. They note that therapists who are available, tend to give what little time they have to those cases they perceive as offering the promise of maximum results for minimum time expended. Too often, this does not include the mentally retarded child. Evidently, preconceptions about the mentally retarded person, e.g., the assumption that they cannot benefit from counseling, have also played some part in limiting their access to therapeutic services and restricting research in this area.

However, contrary to general opinion, when the mentally retarded youngster is seen as a person needing assistance with problems of personal and social adjustment, and/or a reduction of secondary pathology, rather than as a "retardate" in need of IQ change, the implications for therapeutic intervention are more positive.

The question of appropriate therapy goals would, therefore, seem central to the issue of the efficacy of counseling and psychotherapy with mentally retarded children.

Kessler (1966) has reported a number of studies (Cooley, 1945; Glassman, 1942; Wegman, 1943) with children of IQ above 59, which tend to support the hypothesis that there is no direct relationship between IQ level and adjustment after psychotherapeutic intervention. Chess (1962) reported the findings of the first three years of a program offering individual therapy for mentally retarded children with behavior problems. She concluded, "Some success in at least alleviating anxiety and fear might be possible with any child, no matter how limited in intelligence."

The Mental Development Center of Western Reserve University, an outpatient clinic serving mentally retarded children living at home, has informally reached a similar conclusion. The Center's biennial report (1962) notes, "The mechanisms by which retarded children cope with anxiety are not unique, although there is a tendency for them to use withdrawal and regression more, perhaps, than normal children."

While a case can probably be made that the youngster with an extremely low IQ level may not be able to benefit from therapy to the extent that others might, it should be noted that by far, the greatest number of retarded children fall into the "educable," "mild," or "borderline" groups (Phelps, 1965). Therefore, comments to the effect that mentally retarded youngsters are poor therapy risks because of limited vocabulary and directly expressed emotions, reflect a lumping of all retarded children into one retarded grouping, with no allowance for differences between groups and between individual youngsters in each group.

These attitudes, would, therefore, seem to be of questionable validity, more a matter of continued professional bias than replicated results. As Kessler (1966) has noted:

> Therapists working with mentally retarded children have usually been gratified by the results, because the therapy proved by no means as difficult or as tedious as they had anticipated . . .

The decision to incorporate group counseling within the training schedule of RD–2599 had several additional antecedents:

1) Follow up studies of vocational success and/or adjustments of mentally retarded youngsters in vocational training programs have generally reflected the negative effects of poor personal and social adjustment; 2) Furthermore, there is some empirical backing for the hypothesis that anxiety among retarded children tends to interfere with certain types of intellectual function; i.e., accuracy, spontaneity, and expressiveness, more than it does with normals (Silverstein, 1966); 3) Group counseling with educable retarded trainees, in the context of a vocationally oriented training program, has been previously attempted. Wright & Trotter (1968) note that a cooperative program between the Jewish Vocational Service and the Milwaukee public schools established a continuing work adjustment program for retarded youngsters that included counseling sessions. The same authors allude to group counseling at the Johnstone Research & Training Center (Highstown, N.J.) in connection with a project designed to evaluate the vocational potential of retarded adolescents for low level jobs.

In summation, given the above background, and previous experience during RD–1036 at Human Resources Center, it was believed valuable to provide a structure for dealing with problems that might arise during the period of training. Therefore, group counseling was provided for all EMR adolescent trainees during the project.

COUNSELING EMR TRAINEES

During 12 weeks of training, group counseling was provided on a formal basis for all EMR students. The aim of the counseling was to assist the youngsters in coping with all social and personal adjustment problems arising during the training period, whether they were training-connected or not.

Trainees were first assigned to morning and afternoon counseling groups according to their school schedules, and later assigned at random to one of two morning or two afternoon groups, each comprising eight to ten trainees. Counseling was scheduled twice a week, 45 minutes per session, for each group. Permanent space for counseling was provided in a small, private library room at Human Resources Center and in a similarly private area in the Human Resources Center school building.

Group leadership was provided by one male and one female counselor, each of whom assumed responsibility for one of the morning groups and one of the afternoon groups. Both counselors had some previous group experience. Once assigned, each counselor remained with his (her) groups throughout the training program. All four of the counseling groups were heterosexual and interracial.

While no attempt was made to incorporate the counseling processes and outcomes into the study as variables, some general impressions and anecdotal material arising from the procedures would seem to be of interest.

IMPRESSIONS DERIVED FROM COUNSELING EMR TRAINEES

By and large, initial sessions were concerned with role definitions. The group leader was seen by many of the youngsters as a teacher or authority figure and there was an understandable reluctance to discuss topics with emotional content. This "reluctance" also seemed to reflect a general mistrust of the "professional" by the youngsters. As one girl put it:

> I was sent to see the school psychologist. He gave me a whole lot of tests . . . All he said was fine, fine, fine, you're doing fine . . . Then two weeks later I was put in a special class, and that's where I've been ever since. . . I don't think that's so fine.

It is interesting to note that once initial reticence was overcome through the establishment of confidence in the group leader and other group members, another reason for the silence of some of the youngsters surfaced. This factor is probably best described as a fear of speaking to more than a few familiar persons at one time. It seemed to be based on the trainee's assumption that he (she) would not be able to comprehend and manage the group responses to his (her) verbalizations. This anxiety over handling "excessive" input was directly expressed as: "What do I do if everybody answers me at once?"

One might assume, a priori, that retarded youngsters have experienced more negative reactions to their verbalization than have normal youngsters (Guskin, 1962; Spreen & Benton, 1963). Under such circumstances, their "reluctant" verbal behaviors may be as much a reflection of continuing negative expectations of others as any inherent lack of ability to communicate.

In view of observations in the literature (noted above) to the effect that the retarded individual may not derive maximum benefit from the therapeutic milieu due to "verbal deficiencies," the following account of the experience of one of the counseling groups is illuminating:

> As a result of transportation problems and reluctance on the part of some trainees to participate in the sessions, one of the afternoon groups was often reduced to four group members and the leader. Coincident with the reduction of group size, the remaining counselees (three girls and a boy) embarked on lengthy discussions of feelings previously avoided. In addition, these EMR adolescents freely brought their dreams to the sessions, and proved particularly adept at interpreting each others' fantasies. The smaller group size seemed to lessen the fear of "excessive input," and eliminated the "classroom feeling." As one of the trainees put it: "The meetings were sort of like a family get-together."

While the other groups made similar progress in varying degrees, this smaller group seemed to be the most able to consistently explore the depths of their own feelings. Both training problems and problems stimulated by other environments were discussed.

Undoubtedly, other variables, i.e., time spent together, leader personality, the nature of the interpersonal relationships between those trainees who attended regularly and those who did not attend, may have influenced the group's behavior in the above-noted direction. However, the observations may have some implications for the reduction of traditional therapy group size when counseling EMR adolescents, and would seem worthy of further investigation.

Very early in the counseling sessions, and parallel with the problem of dealing with the label "retarded," loneliness emerged as the central theme of many of the youngster's daily lives. Overwhelmingly, they saw the special class as a stigma, and a waste of time (Kovacs, 1969). They tended to go to great lengths to hide their special class status from high school peers, and complained of a lack of social activities with their peer groups. Much of this seemed self-imposed.

Vocational problems brought to the counseling sessions, seemed to lie in the area of "getting on-pay," and the lack of opportunity to engage in more varied and rewarding vocational activities. For the most part, the trainees were resentful that they were limited to two training areas. Many tended to resist the idea that they were retarded and, therefore, restricted in type of work they might choose. Their vocational aspirations seemed most reflective of the middle class Long Island communities from which much of the sample was drawn (Roberts, 1969).

Individually, some trainees seemed to benefit a great deal from the counseling. Others, as might be expected, were helped less, or not at all.

Since no design was provided to measure counseling success or failure, the following example is not typical of the results obtained with all the trainees. On the other hand, this particular anecdotal history was not unique. Furthermore, it is important to consider that it is grossly inconsistent with the general bias that mentally retarded persons cannot benefit from the therapeutic experience.

> One of the trainees was reluctant to participate in the group counseling sessions. He remained almost mute for the first six weeks. At that juncture, he began to verbalize his anger, which he had previously been turning inward. He attempted to sabotage the group by missing several sessions and encouraging others to drop out with him. The counselor's suggestion that these behaviors seemed to be typical of the way he handled his anger at home and at school was vigorously denied. On returning to the group, he confided that he was having trouble at home. . . that he had not really been able to talk to his father for years. Evidently, he was confined to his home after dark and this was limiting his relationships with his peers. However, his anticipation that his father could not be "talked to" had resulted in an angry conviction that there was no way he could solve his problem.
>
> The group told him: "If you're going to act like a 'retard' you can only expect people to treat you like one." They discussed the matter for an entire session, and reached the conclusion that he should present his father with a

reasonable schedule for going out at night. In this way, they noted that he could show his desire to assume responsibility for his own actions. They offered the hope that he might be surprised at his father's reaction. Within the next few weeks, he acted on this advice.

By the end of the training period, he confided to the group that his relationship with his father had improved "tremendously." They were talking with each other about many things, and he was allowed to go out with friends two nights during the week and on weekends. He said he was planning to work during the summer to save up for a car, and that his father had agreed to pay for the insurance and help out with driving lessons. At the end of the training period he was offered a job at Abilities.

CHAPTER 4

DISCUSSION AND CONCLUSIONS

The findings of this investigation corroborate Anastasi's suggestion (1961) that basic skills are separable from general-social behavior. The obtained zero-order correlation between the General Behavioral (Adjustment) Measure and the Basic Skills Tests suggests that these are discrete components. The correlations between the Skill Tests developed in this battery and the criteria of successful training in many cases reach or exceed the correlations found between the Wechsler Full Scale and the Wechsler Performance Scale. Thus, these simple measures reach a predictive power of a multi-test scale but preserve the more defined specificity which was intended in the development of the skill tests for this project. It is further possible that in combination or when used with larger samples in a multiple cut-off procedure, these tests will rise above the correlations found with the Wechsler multi-test battery.

Factorial validity has been defined by Anastasi (1961) as the "correlation of the test with a given factor common to a group of tests or other indices of behavior." Evidence for the factorial validity of the instruments used in this study can be seen in the intercorrelation of the skill tests with the criterion rating scales. The statistically significant measures exceeding the .05, .01, and .001 levels of probability are listed in Tables 5A and 5B. These measures then become valid factorial components of a Basic Skills Analysis (Anastasi, 1961; Super, 1949).

The meaning of these correlations in group statistical prediction is indicated in the table below, adapted from Sanford (1965).

Correlation	Percent*	Percent Above Chance
.20	57	7
.25	58	8
.30	60	10
.40	63	13
.50	67	17
.60	70	20
.70	74	24

* Percent of those who are in top half of the skill test will fall in top half of criterion

Thus, for example, using the 14 statistically significant correlations between the Skill Tests and the Criteria (Tables 5A/5B), and assuming that the criterion measures for achievement (The Clerical/Banking and Industrial/Electronic Assembly Scales) are valid measures of achievement in training, these Skill Tests would increase by 8% to 13% the opportunity for training of those individuals selected above any technique based on chance. In any case, they are comparable to generally obtained correlations in occupational aptitude studies (Ghiselli, 1955). Furthermore, the tests' predictive values will be enhanced beyond the usual chance level where prejudice prevents chance selection of the retarded student for training; this unfortunately is rather a frequent situation faced by the retarded student whose exclusion from training is insured by negatively biased selection procedures. The range of correlations among the Skill Tests and the small sample size suggest the need for cross-validation as well as the development of a multiple cut-off procedure. The limited sample size and deadline for completion of this phase of the study prevented collection of relevant data on this predictive technique.

Turning to another intercorrelational phenomenon, we find that, either as a result of halo rating or the presence of a common element in both scales, a moderately high correlation, averaging approximately .65, was obtained between the Adjustment Scale and each of the two Achievement Scales. Nevertheless, there seems to be an additional or absent element in either the Basic Skills Battery or the Rating Scale which makes the Battery independent of the ratings on the Adjustment Scales. Since the correlation between the ratings on the General and the ratings on the specific scales tends to be somewhat higher than the correlations between the Basic Skills and the Specific Scales, the question is raised whether predictions are more effective, when the behavior (that is General Adjustment) measure is utilized or when the specific work-anchored ratings are utilized. The literature is highly contradictory in this respect as indicated in the "Background for Research" section of this report.

The important thing that seems to have been established by this study is that there are differences between the individual's achievement and his overall adjustment ratings. This is indicated by the total lack of correlation between the Basic Skill Tests and the General Ratings compared to the high incidence of significant correlations between the tests in the Skill Test Battery and the two specific Rating Scales that are anchored to work-specific behavior. In view of the fact that the behavior, the social impression, and the negative attitude-arousing characteristic of retardation are likely to produce halo responses, it is not surprising that the instructors' ratings of general behavior correlated with their ratings of specific skill behavior. What is surprising, however, in view of some of the studies that have been reported previously, is the high degree of independence between measures of specific skills and the ratings of the individual's adjustment behavior.

On purely logical grounds there appears to be a contradiction between the correlation of the General Rating Scale and the Specific Rating Scales in view of the fact that there is no correlation between the Basic Skills Measure and the General Rating Scales. If the Basic Skills Measures and the Specific Skills Tests are measuring the same factors in two different ways, one expects the kind of relation which was obtained. On the other hand, if the General Adjustment Measure is not measuring the same thing as the Specific Achievement Rating Scales then one would not expect to obtain the moderately high correlation between these two measures that was obtained. To clarify this apparent contradiction, one would have to assume that certain similarities are to be found between the Adjustment Measure and the Achievement Measures which are not shared between the Adjustment Measures and the Basic Skills instrument. The analogy might be of a married couple who have two children, one child from a previous marriage and one from the present union. The couple share genetically the child of the present union; the child from the previous marriage is not shared genetically.

Thus, in consequence of the results of this study, one is much less optimistic about finding a single instrument or battery that will help to make the decision on "trainability or employability" of the educable mentally retarded as a group. It is clear that, as in a normal population, the individual who is retarded has both skill characteristics and behavorial characteristics. As would be suspected, each of these affects the other in some situations; the individual's behavioral characteristic of "inattention" may affect his development or performance of a skill. Conversely, the individual's skill may be sufficiently developed to permit periods of inattention that would be disastrous with lesser skills. As the moderately high positive correlations between the Rating Scales suggests, in many instances, the instructor (and perhaps eventually the industrial or clerical supervisor) cannot separate the socially-loaded behavior of the individual from his observations of the skill of the individual. This is

likely to be particularly true in situations where the skill level is assumed to be relatively low or is underestimated so that the supervisor is left with nothing to observe but the social behavior of the individual.

From this study and a review of the literature, a basic truism seems to present itself: valid prediction requires a valid criterion. This study has pointed up the possibility that in prediction studies with the retarded individual professionals have often been using a criterion of success in training or employment which itself is based on an implicit assumption that the retarded individual's success is dependent upon his personal adjustment rather than his skills. This assumption is further based on the belief that the retarded individual is incapable of developing higher skills or a higher level of skills. Thus, when this assumption is made, the criterion serves quite adequately. When this assumption is proven false as was found in the previous RD–1036, then we must focus, as we do with all individuals, on the relevance of general behavior to the specific job. In some jobs "general adjustment" as measured by the present rating scale would appear to be quite relevant, e.g., sales or team assembly work; in others, e.g., bench work, it may be inconsequential. Failure to make this distinction for the mentally retarded individual is tantamount to requiring all prospective employees to meet a social adjustment test.

In emphasizing the skill aspects, there is no intention of minimizing the possibility that general behavioral traits, such as are included in the General Rating Scale of this study, can be modified or improved to meet work requirements. The flood of recent research illustrated by the publications of Krasner and Ullman (1965), clearly indicates that perhaps training programs need to consider some of the behavior traits as social skills with appropriate training programs to develop them. However, it was the intent of this study, and the previous study (RD–1036), to illustrate that the level of the occupational skill of the retarded is a discrete and definable area of functioning apart from the gross social adjustment factors. The Skill Battery developed in this study, although far from perfect, suggests that it is possible to identify skill characteristics through a testing program which can predict skill achievement in a training situation. Further refinements, additions, and cluster analysis studies of these skills are likely to increase their predictive effectiveness. Looking ahead, following these refinements, validation studies on their predictive ability in occupational achievement would appear to be necessary. A further hypothesis is suggested in this discussion: namely, that the higher the skill level or skill preparation of the individual, whether retarded or not, the less important are the social behavioral indices often utilized as criteria for successful training or adjustment. Subsequent research in this area will need to test this hypothesis.

One final point needs to be made in relation to group counseling. This program was made an integral part of the training as a result of experience in the pilot phase of this project. The value of the group counseling can be summarized as follows:

1. It provided an opportunity for the trainees to bring their concerns about training and non-training problems to a neutral situation.

2. It provided the trainees with an opportunity of having an interested party listen to their concerns or to be ready to listen when these concerns were expressable.

3. It increased social interaction outside of the counseling session for members of the counseling group.

4. It reduced social tensions and conflicts between the trainees, parents, and other authority figures.

5. It provided the trainees with models and techniques for problem-solving outside of the counseling sessions.

SUMMARY

The purpose of this study (RD–2599) was to develop a Skill Analysis Test Battery which would aid in the prediction of achievement in two specific areas of training. Forty educable mentally retarded students in work-study classes from 12 high schools in the Long Island area adjacent to the Human Resources Center were selected for training in the Clerical/Banking and Industrial/Electronic Assembly areas. Each student was exposed to a 12 week training program, 6 weeks in each area. A three-part rating scale specifically developed for this study was used as criterion measure against the results of the battery of skill tests specifically developed or adapted from standard tests.

The results yielded nine skill test measures whose correlations with the criterion measures were statistically significant. The skill tests failed to produce significant correlations with the rating scale of general adjustment. These findings suggest that abilities or skills measured by the Skill Test Battery are separable from personal-social adjustment in the educable mentally retarded client. The findings point to the need to separate these two criteria (i.e., adjustment and achievement) in selection of clients for training programs. Failure to separate these criteria will tend to contaminate the criterion for selection with some element which may not be directly relevant to the trainability of the client. Trainability is concluded to be a composite of skill potential and general behavioral characteristics of personal-social adjustment. The results further suggest that it is possible to assess the skills of the educable mentally retarded client apart from his overall behavior just as it is possible to do so in the normal person.

Intercorrelations between the skill tests and the criterion measure range from .27 to .47. These intercorrelations are typical of the intercorrelations reported in the occupational test literature which have been found useful in trainee and worker selection in a non-retarded population. The data, nevertheless, suggest the need for caution in the use of any single selection device in view of the fact that none of the correlations are high enough to permit valid individual predictions. Instead, development of individual prediction measures for training using multiple cut-off scores would appear at this point to be more productive than reliance on single test scores. Variability of aptitude or skill among the educable mentally retarded client produces the same problems in using single scores as it does for a non-retarded population. Therefore, use of such measures as IQ even when derived from individually administered instruments produce only low moderate predictions of success. These measures, although they improve our predictive success from 8% to 16% above chance, miss perfect individual prediction by as much as 43%. The caveat of all counselors and other users of tests in selection continues to be "Beware of the use of single measures for selection." This caveat holds true for the educable mentally retarded as it does for the general population.

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APPENDIX A

INDUSTRIAL/ELECTRONIC ASSEMBLY TRAINING PROGRAM

FIRST WEEK
CLASSROOM INSTRUCTIONS –

Soldering – there are three essentials to successful soldering – Cleanliness, Flux and Heat.

Study and Review of Following:

1. Cleanliness – Be sure the surface to be soldered is clean, rub lightly with fine sandpaper when needed.
2. Flux – A special liquid used to clean metal before soldering, it also helps make the solder flow evenly.
3. Heat – The joint that is to be soldered together must be heated properly so that the solder will flow evenly in the area that is being soldered.

Tools – How to use them

Solder aid – used to hold wires in position when soldering.
Pliers – used to form and hold wires, etc.
Cutters – used to cut wires and all types of leads.
Ideal hand strippers – *used to take coating off of wires.*
Solder iron – A special instrument used in soldering. It has a very hot tip to melt the solder.

Soldering Glossary – These are used in soldering. It is important to know them – Explain purpose.

Soldering – Putting two objects together by melting and applying a special metal.
Rosin Core Solder – The special metal used in soldering. It is made of tin and lead.
Solder joint – The place where two objects are soldered together.
Components – The parts used in mechanical and electrical work.
Terminals – Metal pins on a board which hold wires and components.
Lug – A component put on the ends of wires so that they may be attached to something.
Resistor – A component that slows down or holds the movement of electricity.
Stranded wire – Wire made of many thin metal pieces twisted together.
Wire Coating – The colored material that covers the outside of the metal wire.
Tinning – Putting solder on ends of stranded wire. This keeps the ends of the wire smooth and keeps the strands from coming apart.
Stripping – Taking the coating off the wire by using a special tool.
Excess Solder – Too much solder on a terminal, wire or any solder joint that is being made.
Wicking – When a wire is soldered to a component, the little piece of uncoated wire next to the soldered end must be free of solder. This will let you bend the wire without breaking it.
Bird Caging – This is a mistake. Bird caging is when the piece of uncoated wire that has to stay free of solder does not stay in one piece, but the strands spread and come apart.
Reject – Work done with a lot of mistakes that cannot be used.

Space – After soldering, the distance or gap between the end of the coated wire and the component.

Inhibersol – A cleaning fluid used to wash off excess flux after soldering.

Circuit – The movement of electricity from one component to another.

Printed Circuit – The picture of a circuit printed on a paper or on a board.

Assembly Circuit – Printed direction that tells you how to put a unit together.

Tolerance – When we talk about a resistor, tolerance means the amount of mistake the resistor can make. It can slow down the movement of electricity in a resistor too little or too much.

I. Soldering Training Aids

Types –

1. Soldering iron and holder
2. Flux
3. Sponge
4. Spool solder
5. Solder aid tool

II. Use of Training Aids –

1. Solder Iron and Holder – must always be kept clean of oxide and tinned; must be kept in holder when not being used. Wattage used according to type of work required.

2. Flux – used to help solder flow and to clean surface being soldered. It is to be used sparingly.

3. Sponge – must be wet when using so that iron is kept clean from oxide when soldering.

4. Spool Solder – must always flow evenly around joint being soldered so that voids or cold solder joints do not form. Type of solder used TIN/LEAD.
60 40

5. Solder aid tool – used to hold various types of component leads in position while soldering.

SOLDERING CHECK LIST

1. Were all traces of flux removed?
2. Reject – Pits or voids due to insufficient heating of solder.
3. Reject – Insufficient base wire gap, excessive gap, and burnt insulation.
4. Reject – Nicked wire strands.
5. Reject – Loose unsoldered wire strands.
6. Reject – Hanging insulation strands due to improper stripping.
7. Reject – Cold solder connections.
8. Reject – The existence of solder balls.
9. Reject – Non-adhering layer of solder due to flux not properly activated.
10. Reject – Excessive solder which obscures the connection shape.

11. Reject – Sharp corners or peaks in a solder connection.
12. Reject – Connections with insufficient solder.
13. Reject – Unsoldered strands of wire caused by improper twist or wrap.
14. Reject – Charring, burning, wicking or any other damage to the insulation.
15. Reject – Excessive wicking.
16. Reject – Visible bare copper or base metal.
17. Reject – Wire strands not tightly wrapped resembling a "bird cage."

We can sum up all of the illustrations of our introductory lesson by discussing the four main requirements of a perfectly soldered joint.

1. Mechanical contact – The two parts of the connection must touch each other so that electricity can easily flow between them.

2. Contact areas fused with solder – Maximum electrical reliability can be obtained only if the surfaces of the connecting parts are fused together by the solder.

3. Air excluded from the joint – The joint must not be open to outside air or the conductors will oxidize and gradually form a high resistance joint.

4. Prevention of movement – The joint must be mechanically strong to prevent movement of the conductors which will open the circuit. This strength must come mainly from the conductors as solder is not strong enough to hold most joints together.

HOW TO READ RESISTOR COLOR CODE

Using large color code chart. The resistance, in ohms, is read directly; consisting of four color code bands ––

1. First Digit
2. Second Digit
3. Number of Zeros
4. Tolerance – Percentage

The function of the resistor in an electronic circuit is to oppose the flow of electrical current. This resistance is measured in units called ohms.

Color code – applied to a resistor and to a capacitor.
Main thought – all categories of components, come in innumerable variety of shapes and sizes.

The purpose of this topic is not to describe every typical component, but to make the individual aware of the above fact.

Explain various types of components used in doing electrical work – Capacitors, Diodes, etc.

Resistor Color Code System

1. Values containing a decimal point. The decimal multiplier will be (Red) – Example: (5.600K).

2. Values containing no decimal point the following falls true. The decimal multiplier will be (Orange) (56.000K) from 10K to 99K.

3. 100K to 910K – The decimal multiplier will be (Yellow) (560.000K).

4. Ohms – 10 ohms to 99 ohms, the decimal multiplier will be (Black) (56 Ohms).

5. Ohms – 100 Ohms to 990 Ohms, ending in hundredths, the decimal multipler will be (Brown) (560 Ohms).

6. Megs – 1 Meg to 9 Meg, the decimal multiplier will be (Green) (5.600.000 Meg).

7. Megs – 10 Meg to 99 Meg, the decimal multiplier will be (Blue) (56.000.000 Meg).

"K" = is the abbreviation for the word thousand.
"MEG" = is the abbreviation for the word million.
"Ohms" = is taken from the Greek Alphabet. The symbol "Ω" is the last letter of the Greek Alphabet and the word "Ohms" is taken from the Greek word "Omega".

SECOND WEEK

Harness and Cable – making spot tie (clove hitch)

Harness – lay in and form wires, using written numbered assembly sheet (Route Sheet) Small harness make spot tie (clove hitch).

1. Cut lacing tape approximately 12" long – use scissors for cutting.
2. Bring one end of tape under cable – From right to left.
3. Make ends equal lengths on each side – hold ends in hands.
4. Switch ends from right hand to left hand and left to right – end placed in right hand to be nearest operator.
5. Place end in right hand under cable – leave large loop to right of cable.
6. Draw same end over cable and through large loop – keep on far side of cross-over – from left to right – use left hand for assistance (still holding other end).
7. Pull both ends to make tight – pull ends outward in direction that they are going and draw both loops close together tightly.
8. Make square knot to make tight – two half hitches or common knot.
9. Strip and tin leads of harness.

Large harness – same as harness above. Lace harness and make clove hitch ties and knots.

THIRD WEEK

Small Resistor Terminal Board

1. Follow sample board – form resistor leads and bend around terminals.
2. Cut off leads minimum 180° or 3/4 bend around terminal.
3. Make sure all components are properly lined up.
4. Solder terminals after wiring.
5. Clean all traces of flux from terminals.

Small Fiber Glass Terminal Board

1. Place components in their proper places (following sample board).
2. Form and bend component leads around terminal (same as small resistor terminal board).
3. Cut off leads minimum 180° or 3/4 bend around terminal.
4. Solder all terminals after completing component wiring.
5. Clean all traces of flux from terminals.

Tube Socket Assembly – following flow chart

1. Prep – wires, cut proper length strip and tin.
2. Wrap wires on pins of socket from point to point.
3. Solder wires to pins – just enough solder to cover bottom hole in pins.
4. Clean all traces of flux from pins on socket.

FOURTH WEEK

Connector Hand Soldering Technique

1. Prepare the wire –

   Strip the insulation, being careful that wire strands are not nicked or scraped.
   Twist wire strands slightly to keep them from fanning out.
   Tin the wire, avoid "wicking" – solder up into the insulation.
   Cut to length so that when wire bottoms in solder cup, no insulation will touch the solder joint.
   Place connector into fixture.

2. Tin the solder cup – (using resistance solder iron) apply heat to back of the pin. Add solder so that it flows down the side, filling the solder cup 2/3 full. Continue to apply heat.

3. Insert wire – straight in, all the way to the bottom of the solder cup. Add additional solder if necessary until you are certain there are not (voids) holes in solder, yet avoiding solder spill over. A visible solder bond should appear between the wire and the back of the pin.

4. Various types of connectors worked on.

5. Remove heat – after rosin bubbling ceases, but before solder wicks up into the insulation. Do not disturb the joint for a few seconds until the solder solidifies, or a fractured joint will result.

6. Check results – The complete solder joint should:
    1. Be free of pits and cracks
    2. Have a shiny surface
    3. Have all metals completely covered with solder
    4. Have a fillet (contour) buildup of solder
    5. Have no rosin entrapment
    6. Be free of all dirt, grease, and rosin
    7. Show a (wetting action) on the lead, without flowing up the wire to the insulation
    8. No solder on the outside of the pin

Demonstrate operation with Video Sonic before starting operation.

FIFTH WEEK

Assemble 5 Tube, Standard Broadcast A-M Radio Receiver

1. Follow instructions from instruction assembly sheet – radio to be built in four stages (explain how to read)
    1. 1st stage – wiring and soldering – heater circuit
    2. 2nd stage – wire supply and audio output stage
    3. 3rd stage – wiring the detector and 1st audio stage
    4. 4th stage – wiring the convertor and I.F. amplifier

2. Final assembly completed

SIXTH WEEK

Printed Circuit Board Assembly

Training aids – cutter
long nose plier
spudger
bending fixture
components (various types)
circuit board
print

1. Place print on table – instruct how to read
Explain bending fixture
Check quantities of each type component

2. Place printed circuit board in front of you on table – plain side up – explain printed circuit board

3. Bend components – use slot markers indicated on diagram
Fixture in left hand, with right hand place component in slot and bend downward.
Bend leads tightly for square bend.

4. Grasp board in left hand and component in right hand – printed side down.

5. Place component in proper holes – holes indicated on diagram, component flush to board.

6. Turn board over – hold component to board with finger.

7. Bend lead to board – in direction of circuitry. Lead must be flat to board. Use spudger to flatten. Use pliers to hold lead if lead is heavy gauge.

8. Cut leads – use cutters in right hand, lead length not more than 1/16". Do not nick or scratch circuitry with cutters.

9. After placing all components, make sure all leads are flat to the board.

10. Solder all component leads on circuit side of board. Clean all traces of flux from board.

SEVENTH & EIGHTH WEEK

1. Classroom instruction – study
Review – Soldering glossary
Use of training aids
Soldering checklist
How to read color code
Resistor color code system
Explain various types of components

2. Tests given on classroom instructions

3. Review work that was taught during the past six weeks

    1. Harness and Cable – making of spot tie (clove hitch)
    Large and small harness
    2. Small resistor terminal board
    3. Small fiber glass terminal board
    4. Tube socket assembly
    5. Connector hand soldering technique (various types)
    6. Review on instruction assembly sheet – on building radio kit
    7. Printed circuit board assembly
    8. Prep wires – measure to proper lengths, strip and tin, using solder pot

APPENDIX B

CLERICAL/BANKING TRAINING PROGRAM

FIRST WEEK – FILING

General introduction – discuss filing, its importance and its use in banking area. Illustrate use of alpha filing in clerical area. Visit Banking Department and explain file system – students file or pull cards as assigned. Return to clerical area and give test of alphabetizing skill.

Classroom. Work with alpha filing drill. Introduction to filing workbook.

Instruct group in use of ten-key adder. Assign three to exercises on adder and give others file cards.

Classroom. Blackboard drill in alpha filing with student participation. Work with filing workbook.

Assign adding machines to other students and give file cards to first group.

Lesson in school library. Use of card catalog. Assign students books to locate.

Students read rules of filing from notes. Use filing workbooks.

Assign file card sets.

Continue file card practice and adding machine assignments, if necessary. Use filing workbooks and review filing of business names.

Classroom. General review of filing rules. Short alpha drill. Final Test – 20 minutes.

SECOND WEEK – MONEY HANDLING

General discussion of new topic (money) and introduction to money workbooks.– Coin recognition.

Classroom. Students take notes on background of money. General conversation related to uses of money – salary, goods, etc.

Complete assigned file card sets. Use adding machines. Review notes and continue in money workbook.

Classroom. Check for correct answers in workbook. Assign simple subtraction and addition. Blackboard. Suggest other subtraction procedure for those with problems.

Instruct on cash register. Demonstrate change-making. Discuss parts of dollar and drill on counting up from amount spent.

Use workbook. Drill in subtraction. Use real money and drill in change-making up to a dollar.

Cash register – change-making exercises. Assign adding machines. File cards for those who need individual instruction.

Give money test to each student while others are assigned to cash register and adding machines.

Complete money tests.

THIRD WEEK – BANKING

Instruct group on perforator. Use adding machines.

Classroom. Drill in giving change. Use money workbook.

Students assigned to cash register, perforator and adding machines. Use this time to give individual instruction in filing, money, etc.

Classroom. Discuss Junior Savings Program and need for money-handling, change-making, etc. Work in workbook in making change. Subtraction problems on blackboard with student participation.

Instruct students on row adder, emphasizing an understanding of the keyboard. Bring students to Banking Department and instruct on posting machines.

Assign students to adding machines, perforators, and cash register. Give individual help where needed.

Assign part of group to filing retests and check for improvement. Individual help where needed. Students on change-making exercises on cash register.

Assign students to various office machinery.

Classroom. Alpha file drill. Instruct in Junior Savings deposit-checking procedure, working from printed instruction. Students make up deposits and correct each other's envelopes. Discuss correction procedure and see that students understand notations. Discuss job placement.

FOURTH WEEK – DEPOSIT CHECKING

Two students assigned to bank posting machines. Individual drill with those remaining in money and other areas needing help.

Classroom. Give group prepared deposit – checking envelopes and check each deposit with students. Work on giving change in workbook.

Two students sent to Banking Department for work on posting machines. Individual help given in class as indicated.

Two students assigned to bank posting machines. Individual drill in class as needed.

Cash register and perforator exercises for some. Individual help for others as needed.

All office machinery in use. Individual help as needed.

Classroom.

FIFTH & SIXTH WEEKS

Review.

Preparation for work in Banking.

Clerical/Banking experience in Junior Banking section of Abilities.

APPENDIX C

TEST INSTRUCTIONS

1. WIRE DIAMETER DISCRIMINATION TEST

Make sure the ten wires are arranged in the prescribed order on the table. Arrangement should be about three inches from the edge of the table, centered before the chair. Seat trainee making sure he is comfortable.

> SAY: "This is to see how well you can tell wires apart. We have here ten wires."

Pick up the two wires nearest the edge of the table, with your left hand, and illustrate the following with your right hand by pointing to the appropriate portion of the wire.

> SAY: "As you see, each piece has the metal part inside and a colored coating on the outside. I want you to look ONLY at the metal portion of the wires and arrange them in order, going from the thinnest to the thickest. Right now, the wires are in the WRONG order. When I tell you to start, pick out the thinnest wire and put it here (gesture) near you. Then pick the wire which is a little thicker and put it next to it, and so on. (Repeat as necessary.) Remember, look only at the thickness of the INSIDE METAL PART. You may pick up the wires and look at them. When you are finished, tell me. Do you understand what you have to do? (Repeat above if needed.) O.K. Start now!"

REMEMBER TO TIME TRAINEE!

2. CLERICAL TEST INSTRUCTIONS

The standardized instructions for the Minnesota Clerical Test were utilized with the exception that the Examiner checked the sample items with each subject to see whether they appeared to understand the instructions. If errors were made in the samples, they were corrected by the Examiner with an explanation by the Examiner as to why they were corrected.

3. ARITHMETIC MEASURE INSTRUCTIONS

This is a test of arithmetic. Do as many of these examples as you can. Work as quickly and as carefully as you can. If you have any questions, raise your hand and I will come over to help you. (During the test Examiner checked visually whether the trainee understood what was to be done. Any questions about the procedure were handled directly with each trainee.)

4. BENNETT HAND-TOOL DEXTERITY TEST

The frame should be placed alongside the edge of the table. Make sure the frame is steady and will not move around when one works on it. S will take the test standing up. Make sure the bolts are in the holes on one of the uprights with the heads of the bolts on the inside. Check the bolts to see that the nuts cannot be removed with fingers, or on the other hand, are not so tight that it will be difficult to remove them with wrenches. Make certain that the nuts, once loosened with wrenches, can be removed easily and quickly with the fingers. Close the jaws of the adjustable wrench completely. Place the tools between the uprights. Set the frame with the bolts at S's left.

> SAY: "The idea of this test is to remove all these bolts from this side (point) and put them in the same order on the other side (point) with the heads of the bolts on the inside. The best way is to remove all the bolts from the top row (point) and put them down on the bench. The quickest way is to loosen all the nuts on each row before putting down your tools. Use TWO tools to loosen each bolt. Then spin off the nuts (point) with your fingers. Then remove the middle row and put those parts on the bench. Then, as you remove each bolt from the bottom row (point), put that bolt in a hole in the bottom row of the other side (point). Put in all the smallest bolts and tighten the nuts with your fingers. Then use the right tool to make them even tighter. When you are finished with the smallest bolts, put in the medium sized bolts and tighten them in the same way. Finally, put in the biggest bolts and tighten them too. When you tighten the nuts on these bolts, tighten them with the wrenches just tight enough so that they cannot be removed with the fingers. DO NOT PUT TOO MUCH PRESSURE ON THEM. Make sure, when you put the bolts on this side, (point) that the heads of the bolts are on the inside."

Repeat instructions as necessary. Feel free to supplement it in any reasonable way as to give S best possible understanding of task to be accomplished.

5. BLIND SLIDE SCALE

This test consists of two parts. However, before test is administered you have to ascertain whether S knows the concept of the various distances he is about to estimate.

> (Pick up regular foot ruler) SAY: "This is to see how good you are at telling different distances." (Hold ruler with numbers facing S) SAY: "Show me how much one inch is. ...Show me how much three quarters of an inch is. ...Show me how much a half an inch is. ...Show me how much one eighth of an inch is. ... Show me how much a quarter of an inch is. Good ..." (Note on bottom of scoring sheet if S seems NOT to know any one of the above distances. Note distances in question.)

Part I

Pick up metal ruler with no markings on it, in such a way that blank side faces S. MAKE SURE YOUR FINGERS DON'T COVER END OF RULER. Put metal clip on right side of ruler. /on score sheet R and L refer to your right and left as you hold the ruler, not the examinee's right and left.

SAY: "Now this is to see how well you can tell distances when you don't see the numbers on the ruler. I would like you to move this clip (point) to the exact MIDDLE of the ruler. Good ..."

Record distance on score sheet. Move clip now to left side of ruler and repeat instructions. Repeat whole procedure two more times as indicated on score sheet.

Part II

Pick up metal ruler with the mark in the center. Place paper clip right on the center line.

SAY: "Now, we are going to do something a little bit different. I want you to move this clip (point) THIS way (gesturing to your right) a half an inch. Good ..."

The above is specific for the first item. Repeat for other items in the same way gesturing in the appropriate direction as indicated on score sheet, and calling for the designated distance. After each trial ascertain distance marked by the clip and record it on the score sheet. DON'T FORGET TO SLIDE CLIP BACK TO CENTER MARK AFTER EACH TRIAL!!

6. MAIL SCALE

Make sure S is comfortable and is sitting near enough the table to rest his elbow on it. Scale should be about midway between trainee and examiner, calibrated side facing examiner.

SAY: "This is to see how well you can tell different pressures. I will ask you to put your finger here (point) and push it down real slowly until I tell you to stop. O.K. Put your finger here (point to platform) and push it down real slowly, until I tell you to stop. Then just hold it there. Let go. Now – push it down slowly – stop! Try to feel how much you pushed it down. O.K. – let go. Now, I want you to push this (point) down again, JUST AS MUCH AS BEFORE, but now, do this all by yourself."

Make sure that you are watching the scale. The instant trainee halts at a certain pressure ascertain pressure and record it on score sheet. Follow same procedure for each pressure as indicated on score sheet. You should be able to record pressure to the half ounce.

7. O'CONNOR FINGER DEXTERITY TEST

Seat trainee at table. Make sure he is comfortable. His chair should be close enough to the table that he can rest his arms on its surface. The instrument is placed before trainee about 12 inches from the edge of the table. The tray with the pins should always be near the hand to be used.

SAY: "This is to see how well you work with your fingers. Here is a board with room for three pins in each hole. Pick up three pins at a time and fill all the holes. Put the pins in the holes as fast you as can. Use only one hand. Start in the farthest corner and work toward you, like this (gesture in the appropriate direction). Be sure to fill each row across completely (repeat

gesture) before you start the next. Do not skip around. If you drop a couple of pins on the floor you will still have enough pins. DO NOT stop to pick them up."

Again, show by gesturing, the direction in which the rows are to be filled in. Have trainee fill in the TOP TEN HOLES for practice. Tip the pins out, allow a moment's rest then start trainee. MAKE SURE YOU TIME TRAINEE.

DON'T FORGET, ON THIS TEST YOU HAVE TO ENTER ALSO THE AMOUNT OF TIME TAKEN TO COMPLETE THE FIRST HALF OF THE BOARD. THE LINE MARKED ACROSS THE BOARD INDICATES ITS CENTER.

8. SPIRAL TEST OF MOTOR INHIBITION

Part I

NORMAL TEMPO PHASE

Place a spiral before trainee so that its open side is on trainee's left and its closed side is on trainee's right.

SAY: "This is a spiral, you see. It starts here (point with pencil to center) and gets bigger and bigger. I want you to take this pencil and draw your way out of the spiral like this (motion the direction). Start here (point to the center) and draw between the lines until you get all the way out here (point out pathway with pencil, emphasizing that it goes between lines rather than on the line.) Do not lift your pencil. Do not talk while you work, just draw your way out."

Record the amount of time taken to draw his way out of the spiral, from initial point of contact in the center until his pencil leaves the spiral.

Part II

MOTOR INHIBITION PHASE

Place a second spiral in front of trainee in the same position as above.

SAY: "Here is another spiral. I want you to do the same as before (repeat above instructions if necessary), draw your way out of the spiral from here in the center (gesture) to out there (gesture). But, this time, I want you to draw the line as SLOWLY as you can."

Remind trainee to remain silent and to keep his pencil moving when indicated. If he artifically attempts to slow his forward motion by drawing a zigzag course, ask him to draw a more direct course. Record time as above.

9. SMEDLEY HAND DYNAMOMETER

For every trainee the dynamometer has to be set individually to accommodate the most comfortable grip for trainee. This is done by whirling the inner stirrup until trainee reports that he finds it comfortable. Then instrument is set by means of the clutch so that the inner stirrup cannot twist while in use.

> SAY: "This is to see how strong your grip is. I want you to pull down this (point) as hard as you can and then let go."

Make sure you illustrate use of the dynamometer. Make sure that you record the reading on the score sheet. Allow three trials with each hand using alternate hands. Leave about ten seconds pause between trials to avoid excessive fatigue. At each trial encourage trainee to try his best.

10. FARNSWORTH DICHOTOMOUS TEST FOR COLOR BLINDNESS

Before beginning test, color caps No. 1 – 15 should be arranged in a row in RANDOM ORDER in the cover panel of the rack, so that trainee can easily select them for placement in the lower panel, the one in which the reference color cap is mounted. Place the case on the table so that the inclined tray is nearest trainee and the fixed cap is at trainee's left (reversed if left-handed).

> SAY: "The object of this test is to arrange these buttons IN ORDER according to COLOR. Take the button from here (point to the appropriate panel) which looks MOST like this button (point to reference cap) and put it here (indicate space next to reference cap.) Good. ... Now take the button which looks MOST like that and put it next to it (gesture)."

Keep repeating directions for each button. If trainee appears to be able to continue by himself without further directions, allow him to complete the task on his own. If not, however, after each button is placed, it may be necessary to say:

> "Now, which one of these buttons (indicate) is most like the last one (indicate)?"

After trainee has moved to the next testing station, close the case, turn it upside down, open it and record the sequence of the numbers on trainee's score sheet. Then randomize buttons to prepare for next use).

APPENDIX D
SAMPLES OF TEST FORMS

ARITHMETIC MEASURE

Name_____ Date_____

How many dots do you see?

1. . . . Answer:_____

2.
. . .
. .
.
Answer:_____

3.
. . . .
. . . .
. .
Answer:_____

4.
. . . .
. . .
. . .
. . .
Answer:_____

5.
. . . . .
. . .
. .
. .
. . . .
Answer:_____

Now, do these examples:

6.) 9 + 3 = _____

7.) 11 + 7 = _____

8.) 9 - 3 = _____

9.) 11 - 7 = _____

10.)
5
8
3
= _____

11.)
6
4
2
= _____

12.) 58 + 49 = _____

13.) 65 - 38 = _____

14.) 55 - 48 = _____

15.) $\begin{array}{r} 55 \\ +\ 48 \\ \hline \end{array}$

16.) $\begin{array}{r} 80 \\ +\ 23 \\ \hline \end{array}$

17.) $\begin{array}{r} 80 \\ -\ 23 \\ \hline \end{array}$

18.) $\begin{array}{r} 56 \\ 45 \\ 30 \\ \hline \end{array}$

19.) $\begin{array}{r} 20 \\ 44 \\ 48 \\ \hline \end{array}$

20.) $\begin{array}{r} 4.2 \\ +\ 2.5 \\ \hline \end{array}$

21.) $\begin{array}{r} 4.5 \\ -\ 2.8 \\ \hline \end{array}$

22.) $\begin{array}{r} 7.5 \\ +\ 1.4 \\ \hline \end{array}$

23.) $\begin{array}{r} 7.8 \\ -\ 3.9 \\ \hline \end{array}$

24.) $\begin{array}{r} 2.50 \\ 7.87 \\ 3.42 \\ \hline \end{array}$

25.) $\begin{array}{r} 2.87 \\ 6.50 \\ 4.11 \\ \hline \end{array}$

26.) $\begin{array}{r} 17.50 \\ 18.49 \\ 13.72 \\ \hline \end{array}$

27.) $\begin{array}{r} 16.49 \\ 12.40 \\ 10.63 \\ \hline \end{array}$

Look at the following examples. First, you multiply the numbers on the left side, then you add the sums on the right side.

EXAMPLES:

$\begin{array}{r} 4 \times 5 = 20 \\ 3 \times 2 = 6 \\ \hline 26 \end{array}$

$\begin{array}{r} 9 \times 5 = 45 \\ 2 \times 25 = 50 \\ \hline 95 \end{array}$

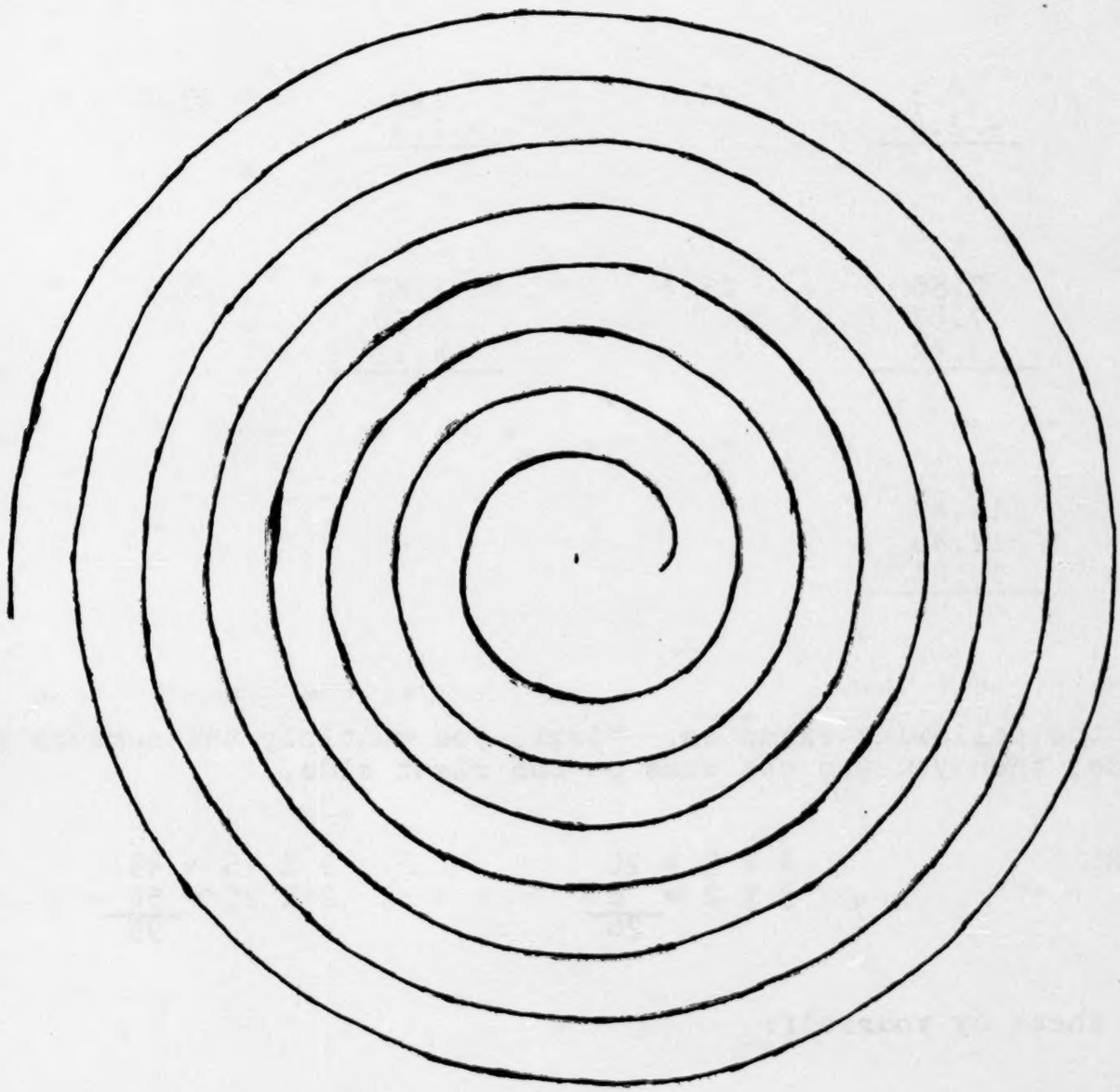
Now, do these by yourself:

28.) $3 \times 5 =$
$4 \times 25 =$_____

29.) $7 \times 10 =$
$8 \times 25 =$
$3 \times 50 =$_____

30.) $5 \times 5 =$
$3 \times 10 =$
$3 \times 25 =$
$2 \times 50 =$_____

SPIRAL TEST OF MOTOR INHIBITION (STMI)



APPENDIX E
RATING SCALE

TRAINEE QUESTIONNAIRE

RATER: _____

DATE: _____

Please rate _____ on the questions below.

Indicate your rating on each question by placing an X or ✓ in the box that best describes this trainee on that particular question. Be sure to rate each question separately. Try not to think of the trainee's rating on any question or trait, when you are deciding on his rating for a particular question. Rate him only as he compares to others in the group of work-study trainees.

FOR EXAMPLE:

TRAINEE: Frank Jones-Smith

	ALWAYS TRUE	NEARLY ALWAYS TRUE	FREQUENTLY TRUE	OCCASIONALLY TRUE	RARELY TRUE	NEVER TRUE
1. Works Quickly				✓		
2. Shows Good Coordination	✓					
3. Sense of Humor is Appropriate			✓			

The trainee rated by this supervisor was rated as having good coordination nearly all of the time, working quickly only occasionally, and having a sense of humor that is rarely appropriate.

GENERAL

STATEMENT:	ALWAYS TRUE	NEARLY ALWAYS TRUE	FREQUENTLY TRUE	OCCASIONALLY TRUE	RARELY TRUE	NEVER TRUE
1. Adjusts easily to changes in work activity						
2. Works steadily without supervision						
3. Tends to underate owa ability						
4. Follows instructions well						
5. Is punctual in observing work hours, breaks, lunches, etc.						
6. Gets started quickly after arriving or returning to work						
7. Pays attention to safety rules						
8. Leaves work area clean and neat when finished						
9. Tries hard to succeed						
10. Gets along with fellow trainees						
11. Gets along with supervisors and instructors						
12. Accepts correction or criticism well						

das

GENERAL

QUESTION:	ALWAYS TRUE	NEARLY ALWAYS TRUE	FRE-QUENTLY TRUE	OCCASSION-ALLY TRUE	RARELY TRUE	NEVER TRUE
13. Sticks to a task for long periods of time?						
14. Is friendly and sociable?						
15. Does not give up even if a task is difficult?						
16. Shares tools, equipment and other supplies, when necessary?						
17. Works well in group activities?						
18. Is easily influenced by other trainees?						
19. Asks questions or talks to supervisors easily?						
20. Expresses ideas clearly?						
21. Is patient with delays?						
22. Judges own work performance realistically?						
23. Tends to show anger?						
24. Refuses to do some tasks?						
25. Respects authority?						
26. Respects fellow trainees?						

GENERAL

QUESTION:	ALWAYS TRUE	NEARLY ALWAYS TRUE	FRE-QUENTLY TRUE	OCCASSION-ALLY TRUE	RARELY TRUE	NEVER TRUE
27. Controls conversation during work?						
28. Shows interest in learning new tasks?						
29. Tends to overrate own ability?						
30. Is neat in personal appearance?						
31. Maintains personal cleanli-ness?						
32. Maintains alert posture and appearance at work?						
33. Tries to be best in the group?						
34. Tends to be absent?						

SOLDERING

STATEMENT	ALWAYS TRUE	NEARLY ALWAYS TRUE	FREQUENTLY TRUE	OCCASIONALLY TRUE	RARELY TRUE	NEVER TRUE
1. Matches soldered connections against printed specifications correctly						
2. Matches numbers on layout chart to numbers on wire casing correctly						
3. Clears dirt or foreign material from connection points						
4. Matches wires to terminals by color correctly						
5. Notes color or reflective characteristics of solder or metal						
6. Applies and holds proper pressure in soldering						
7. Places pencil iron precisely on solder joints						
8. Maintains adequate quality of work after long periods of soldering						
9. Maintains adequate quantity of work after long periods of soldering						

SOLDERING

STATEMENT	ALWAYS TRUE	NEARLY ALWAYS TRUE	FREQUENTLY TRUE	OCCASIONALLY TRUE	RARELY TRUE	NEVER TRUE
10. Makes good temporary screw and wire adjustments manually without tools						
11. Makes good temporary connections or adjustments with tools						
12. Effectively uses wire stripping tools						
13. Properly judges length of strip to be made						
14. Maintains insulation and separation of wires from each other as required						
15. Selects right tools for each job						
16. Arranges materials for efficient work						
17. Maintains satisfactory quality of completed work						
18. Finishes work in a reasonable amount of time						
19. Keeps steady work pace during the day						
20. Shows high consistency of work quality from day to day						

das

SOLDERING

STATEMENT	ALWAYS TRUE	NEARLY ALWAYS TRUE	FREQUENTLY TRUE	OCCASIONALLY TRUE	RARELY TRUE	NEVER TRUE
21. Solders wires with minimal error						
22. Cleans soldering iron when necessary						
23. Works well on small components						
24. Understands principle of resistor color code						

BANKING QUESTION	ALWAYS TRUE	NEARLY ALWAYS TRUE	FRE-QUENTLY TRUE	OCCASION-ALLY TRUE	RARELY TRUE	NEVER TRUE
1. Accurately checks delivery bags.						
2. Correctly counts delivery bags.						
3. Accurately notes school name, batch number and date on slip.						
4. Uses slicing machine effectively.						
5. Properly arranges envelopes after slicing.						
6. Empties envelopes before checking deposits.						
7. Is able to check identification data (Account Number, Student's Name on Account Slip).						
8. Is able to check deposit slips for accuracy of entries.						
9. Properly sorts money after checking.						
10. Correctly notes endorsement on checks.						
11. Is able to check money in envelope against amount noted on deposit slip.						
12. Properly handles slips not accompanied by money.						
13. Knows when to write out new deposit slips.						

QUESTION	ALWAYS TRUE	NEARLY ALWAYS TRUE	FRE-QUENTLY TRUE	OCCASION-ALLY TRUE	RARELY TRUE	NEVER TRUE
14. Uses notations "overage" & "shortage" correctly.						
15. Correctly fills out new deposit slip when necessary.						
16. Properly arranges deposit slips and passbooks after checking.						
17. Correctly opens posting machine.						
18. Clears machine before posting.						
19. Correctly enters school account number in posting.						
20. Arranges material before posting.						
21. Correctly posts deposits.						
22. Correctly closes off posting for each machine.						
23. Maintains proper sequence of operations in posting.						
24. Notifies supervisor of errors.						
25. Accurately checks new deposits after removing from school bags.						
26. Correctly places passbook and nameplate in set-up.						

QUESTION	ALWAYS TRUE	NEARLY ALWAYS TRUE	FRE-QUENTLY TRUE	OCCASION-ALLY TRUE	RARELY TRUE	NEVER TRUE
27. Knows sequence of junior banking operations.						
28. Shifts from one operation to the next easily.						
29. Has appropriate knowledge of filing.						
30. Can count change accurately when necessary.						